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A Study of the Genus Psoralea in America.

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The genus *Psoralea* was first established by Linnæus in the second edition of the Gen. Plant., 358 (1742) and credited to Royen.

In the first edition of the Sp. Plant., 762 (1753), eight species are described, only one of which is credited to America, and is probably an introduced plant from the Island of Madeira.*

DeCandolle in Prodr. 2: 218 credits fifteen species to the United States, Canada and Mexico, some of which, however, have been reduced.

Bentham and Hooker in Gen. Plant. 1: 491, give thirty species to North America and six to South America.

In his Rev. Gen. Pl., p. 193, O. Kuntze transfers all the species of *Psoralea* to the Genus *Lotodes*, Siegesbeck, Fl. Petrop. 66 (1736).

An attempt has been made in this study to base the classification as much as possible on the fruit characters, which are very marked. The genus is accepted as described by Bentham and Hooker.

§ 1. Leaves palmately 3–5-foliolate (rarely 7-foliolate).

Herbs, erect or assurgent, branching (except *P. cyphocalyx*).

Flowers small (5–8 mm.).

Pods globose.

Leaflets linear-oblong, pods glabrous.

1. P. lanceolata.

Leaflets filiform-linear except the basal ones, pods glabrous.

2. P. micrantha.

Leaflets obovate, cuneate-obovate or lanceolate-oblong, pods villous.

3. P. Purshii.

* Psoralea Americana.

Pods lunate, transversely wrinkled and roughened; leaflets filiform-linear. *4. P. Lupinellus.*

Pods ovate-oblong, wrinkled; leaflets and spikes sessile or nearly so. *5. P. bracteata.*

Pods ovoid or ovate.

Pods with an abrupt short beak.

Leaflets small, flowers few, loosely scattered on slender elongated racemes. *6. P. tenuiflora.*

Leaflets oblong-obovate, flowers several together in interrupted spikes or racemes. *7. P. obtusiloba*

Leaflets oblong, flowers many in crowded elongated spikes or racemes. *8. P. floribunda.*

Pods with a slender elongated beak.

Leaflets linear, flowers slender-pedicelled in loose elongated racemes. *9. P. linearifolia.*

Leaflets linear-lanceolate, plant silvery canescent; calyx inflated in fruit. *10. P. digitata.*

Leaflets oblong, plant silvery or woolly-canescent throughout; calyx not inflated in fruit. *11. P. argophylla.*

Flowers large (1–2 cm.).

Calyx gibbous on the upper side.

Bracts broadly ovate (or in *P. canescens* often lanceolate-ovate).

Bracts as long as the calyx and enclosing it. *12. P. Reverchoni.*

Bracts barely longer than the pedicel; leaflets lanceolate-linear. *13. P. cyphocalyx.*

Bracts as long as or somewhat shorter than the pedicel; leaflets obovate, sparingly canescent or glabrous. *14. P. canescens.*

Bracts lanceolate-ovate, attenuate, as long as the calyx lobes; leaflets oblong. *15. P. cuspidata.*

Plants low, spreading, acaulescent or apparently so.

Flowers small (5 mm.).

Leaflets small, pod globose, with a long attenuate beak. *16. P. pentaphylla.*

Flowers large (1–2 cm.) and roots fusiform tuberous.

Hirsute with weak spreading or appressed white hairs.

Leaflets oblong-cuneate. *17. P. esculenta.*

Leaflets linear-oblong. *18. P. hypogæa.*

Stems hirsute; leaflets glabrous, except the ciliate margins. *19. P. subacaulis.*

Hirsute with more or less rigid, appressed or spreading pubescence.

Bracts large, scarious, deciduous, as long as the calyx. *20. P. Californica.*

Bracts much smaller than the calyx, the lower lobe of which is broadly ovate or spatulate. *21. P. castorea.*

1. PSORALEA LANCEOLATA Pursh.

Psoralea lanceolata Pursh, Fl. Am. Sept. 475 (1814). Type in Herb. Acad. Phila.

Psoralea elliptica Pursh, Fl. Am. Sept. 741 (1814). Type in Herb Acad. Phila.

Psoralea arenaria Nutt. Gen. 2: 103 (1818).

Psoralea laxiflora Nutt.; Torr. and Gray, Fl. N. Am. 1: 299 (1838).

Psoralea scabra Nutt.; Torr. and Gray, Fl. N. Am. 1: 300 (1838).

Erect or assurgent, 15–40 cm. or more high, aromatic glandular throughout; stems glabrous or with a minute pubescence and often a few scattered scarious scales at the base; stipules 3–12 mm. long, linear-lanceolate or setaceous; petioles 1–2 cm. long; leaves 3-foliolate; leaflets 1½–4 cm. long, linear-lanceolate or the basal ones obovate, acute or obtuse, mucronate, glabrous or with a few hairs; peduncles longer than the leaves, (2½–5 cm.); inflorescence capitate, small; bracts minute; flowers nearly white; calyx minutely hairy; lobes nearly equal, obtuse; pod globose, 5 mm. long, light with conspicuous large raised brown glands, nearly glabrous; beak small and erect; seed globose, brown.

In O. Kuntze Rev. Gen. Pl. 193, *P. ellipticum* under *Lotodes* is claimed to be on p. 471, of Pursh, Fl. Am. Sept., and therefore preceding the description of *P. lanceolata*, whereas in reality the description of Bradbury's plant under that name occurs in the supplement on p. 741.

Saskatchewan—Macoun, No. 110 (1879).

North West Terr.—Nicollet; River that Turns, Macoun (1879).

Montana—L. F. Ward (1883); Coues; Yellowstone Park, Chas. H. Hall (1888); above Glendive, L. F. Ward.

Idaho—Camass Creek, W. H. Forwood, No. 41 (1880).

Oregon—Kellogg and Harford, No. 167 (1868–9); E. Hall, No. 105 (1871); Lyall (1860); Geyer, No. 653.

Dakota—Stevens. Pac. R. R. Exp.

Nebraska—Valentine, J. M. Bates, No. 10; Keith Co., G. D. Swezey; Fort Kearney, Fendler (1849); Fort Pierre, Hayden (1853–4).

Iowa—Sioux City, A. S. Hitchcock (1888).

Kansas—Manhattan, Kellerman (1890).

Missouri—Lewis and Clarke (type of *P. lanceolata*); "Upper Louisiana" from Herb. Bradbury, in Herb. Camb. (type of *P. ellipticum*); Nicollet (1839); Buckley (1853).

Colorado—Palmer; Colorado Springs, M. E. Jones, No. 142 (1878); Wolf and Rothrock, No. 181 (1873); Fritchy, No. 8 (1886).

Arizona—Plains near Chirricalma, Lemmon (1881).

2. PSORALEA MICRANTHA A. Gray.

Psoralea micrantha A. Gray; Torr. Pac. R. R. Rep. **4**: 77 (1856). Type in Herb. Columbia College.

Assurgent, 3 dm. or more high, from a horizontal root or long slender rootstock of often 1 m. or more in length; stems glabrous, with scattered brown glands, and often broadly-lanceolate or ovate scales at the base; stipules setaceous, varying in length; leaves 3-foliolate, crowded; leaflets linear or filiform-linear, 1–5 cm. long, the basal ones oblong or cuneate-oblong; peduncles about the length of the leaves; flowers white or bluish in small heads or loosely scattered in short spikes; bracts minute; calyx somewhat hirsute, glandular, the lobes about equal; pod globose, over 5 mm. long, glabrous, light brownish with raised darker glands and a straight, slender beak; seed 5 mm. long, globose, somewhat flattened when dry, brown, smooth and shining.

Nebraska—Chimney Rock, H. Engelmann (1858); Fort Kearney, H. Engelmann (1858); Banner Co., Rydberg (1890); Kearney Co., Rydberg, No. 53 (1891).

Kansas—Manhattan, Kellerman.

Indian Terr.—Last Camp on the Canadian, Bigelow (1853), type.

Oklahoma Terr.—Guthrie, Carleton, No. 151 (1891).

Arizona—Rusby (1883); Plains East of the San Francisco Mts., Lemmon (1884); East of Mt. Agassiz, Lemmon.

3. PSORALEA PURSHII, n. sp.

Lotodes ellipticum latifolium Kuntze, Rev. Gen. Pl. i. 193 (1891), not *P. latifolia* Torr. Type Empire City, M. E. Jones, No. 3825 (1882).

Assurgent, glandular throughout, 1–6 dm. or more high from a long slender rootstock, stems glabrous or often somewhat hirsute at the base, scales ovate, scarious; stipules 5 cm. or more long, lanceolate; leaves 3-foliolate, 1½–4 cm. long, obovate, cuneate or elliptical, or the uppermost nearly lanceolate and often much narrower, varying greatly in size and shape, retuse or mu-

cronulate, glandular, glabrous or with a few scattered white hairs; peduncles varying in length, rarely longer than the leaves; flowers scattered in slender spikes or crowded in nearly capitate heads; bracts minute; calyx-lobes about equal, sparingly hirsute; pod globose, over 5 mm. long, with a short erect beak, light with scattered brown glands, and more or less densely villous with silky white hairs; seed globose, 5 mm. long, light brown.

Washington—On a sand hill near the Columbia River, Suksdorf, No. 963 (1890); near Columbus, Suksdorf, No. 851 (1886).

Nevada—Grass Valley, Watson, No. 250 (1868); Empire City, M. E. Jones, No. 3825.

Idaho—Nez Percé Co., Sandberg.

The specimens here cited have passed as *P. lanceolata* as well as several that are put under *P. micrantha*. The type of *P. lanceolata* is an intermediate form from the plains of Missouri, and there is no fruit description. The broad leaved form, *P. Purshii*, has a conspicously villous pod, and it will be interesting to note whether that character remains constant in future collections. The extremes are so marked that it is deemed advisable to keep them separate, though it will be difficult to distinguish them without the fruit.

4. Psoralea Lupinellus Michx.

Psoralea Lupinellus Michx. Flor. Bor. Am. 2: 58 (1803). Type in Herb. Michx., fide Torrey and Gray.

Psoralea Floridana Shuttleworth in Distrib. Pl. Rugel (1843), name only.

Erect, 3–6 dm. high, slender, branching, glabrous, somewhat glandular; stipules 2–5 mm. long, setaceous; petioles mostly shorter than the leaflets; leaves 5–7-foliolate; leaflets 5–8 cm. long, filiform-linear, with a few scattered glands, the lower ones rarely narrowly oblong-cuneate; peduncles longer than the leaves; racemes slender; flowers few, scattered; bracts minute, ovate, cuspidate; calyx sparingly pubescent, the lobes short, nearly equal; pod 1 cm. long, glandular, somewhat lunate, obliquely twisted, transversely wrinkled, with a short curved beak; seed ovoid, brown.

North Carolina—"Fields of Carolina," Pursh; Cumberland Co., Curtiss (1845).

Georgia—Baldwin; Boykin; Dr. Grant; Niesler; Lewis Leconte; Savannah, Mrs. Say.

Florida—Nuttall; Buckley; between Tallahassee and St. Mark's, Rugel (1843); South Florida, Rugel, No. 163 (1845); Chapman, No. 44 in Herb. Torrey; Tampa, Garber, No. 34; Curtiss (1875); near Jacksonville, Curtiss, N. Am. Pl., No. 558; East Florida, Mary Reynolds.

5. Psoralea bracteata L.

Psoralea bracteata L. Mant. 264 (1771), fide M. K. Curran, Bull. Calif. Acad. 1: 135 (1885).

Psoralea fruticosa Kellogg, Proc. Calif. Acad. Sci. 7: 91 (1876).

A low spreading sub-shrub, more or less canescent-pubescent throughout; stipules nearly 1 cm. long, lanceolate-subulate; leaves 3-foliolate, sessile or very short-pedicelled (becoming elongated when old), crowded; leaflets 1–2½ cm. long, oblong-obovate, cuneate, mucronate with a recurved rigid spine, very glandular; spikes sessile at the ends of the branches, the lower flowers in the axils of the leaves; bracts lanceolate or ovate, acuminate, nearly as long as the flowers; calyx-lobes ovate, acute, glandular, the lower lobe the longest; "pod glabrous, ovate-oblong, acute, wrinkled and roughened."

California—Streams of Mt. Tamalpais, F. P. McLein (1873). Apparently not since collected. I have not seen mature fruit of this species.

6. Psoralea tenuiflora Pursh.

Psoralea tenuiflora Pursh, Fl. Am. Sept. 475 (1814). Type in Herb. Acad. Phila.

Erect, 2–6 dm. or more high, often from a long subterranean root, stems branching, glabrous or minutely canescent, especially above, glands black, scattered; petioles mostly shorter than the leaflets; leaves 3-foliolate, the basal ones rarely 4–5 foliolate; stipules minute, setaceous; leaflets 5 mm.–4 cm. long, 3–8 mm. wide, oblong elliptical, obtuse or mucronulate, glandular on both surfaces, glabrous above, sparingly canescent beneath; peduncles 2–8 cm. long; bracts minute, ovate, acuminate; flowers 1–3 together, scattered on slender racemes, calyx very small, with a few hairs, closely covered with dark reddish or brown glands, the lobes acute; pod 8 mm. long, ovoid, glabrous, covered with reddish or brown glands; beak short, stout, somewhat recurved; seed 5 mm. long, ovoid, brown.

Differing from *P. floribunda* in its more slender habit, smaller leaves, smaller, fewer and more scattered flowers and generally

more glabrous and glandular appearance. Possibly the two species may run together, though in the bulk of the material in the herbaria examined they can be easily separated. Mr. P. A. Rydberg, who has studied the species in the field, considers them undoubtedly distinct, and it seems advisable to keep them apart.

Montana—Fort Custer, Mearns, No. 244 (1889).

Wyoming—North Fork of the Platte, Frémont (1842); Turkey Creek, Frémont (1845).

Illinois—Beardstown, Geyer (1842).

Missouri—Big Bend of the Missouri, Lewis and Clarke (Sept. 21, 1804, type); Herb. Chapman.

Arkansas?—Vernijo, Abert (1840).

Nebraska—Fort Kearney, Engelmann (1856); Drexel Co., P. A. Rydberg (1890); near Sidney, P. A. Rydberg, No. 47 (1891).

Kansas—Sherman Co., Smyth, No. 345 (1892).

Colorado—G. W. Hulse; Golden, Britton (1882); Boulder, E. Penard, No. 176 (1891).

7. PSORALEA OBTUSILOBA Torr. and Gray.

Psoralea obtusiloba Torr. and Gray, Fl. N. Am. 1: 300 (1838). Type in Herb. Columbia College.

Psoralea tenuiflora var. *obtusiloba* S. Wats. Bibliogr. Ind. 255 (1878).

Erect, 30–60 cm. high, branches spreading, stems more or less canescent with fine, appressed, silky, white hairs; stipules very small, setaceous; petioles much shorter than the leaflets, the upper ones often nearly sessile; leaves 3-foliolate, the basal ones often 4–5-foliolate; leaflets 5 mm. to 3 cm. long, 3–12 mm. or more wide, oblong-obovate, retuse or mucronulate, covered on both surfaces with minute black glands, glabrous above, minutely canescent beneath; racemes 3–9 cm. long; flowers loosely scattered; bracts very small, ovate, cuspidate; calyx canescent with white, silky hairs, the lobes glandular, obtuse or acutish; pod about 8 mm. long; beak short, stout, straight; seed compressed, obliquely ovoid, brown.

Intermediate between *P. tenuiflora* and *P. floribunda*. Differing from the latter in its less dense inflorescence and much broader leaflets and somewhat larger flowers and less pubescent or canescent appearance.

Texas—Drummond (II.) No. 123; (type); Lindheimer, No. 36 (1843); El Paso, Vasey (1881); on the Upper Colorado (1854), collector unknown.

New Mexico—Wright, No. 969?; Cobra Spring, W. B. Pearce (1878).

Arizona—Bear Mts., Rusby, No. 78 (1880); Oak Creek, Rusby (1883); Willow Springs, Palmer, No. 512 (1890); Oracle Camp, Sta. Catalina Mts., Lemmon (1881); Flagstaff, M. E. Jones, No. 3952 (1884); Flagstaff, Tracy and Evans, No. 276 (1887); Mexican Boundary Survey, No. 218; Fort Whipple, Coues and Palmer, No. 83 (1865); Fort Apache, Mrs. R. W. Hoyt (1893).

Mexico—Berlandier, No. 1749 (1828); Cañon of Guadaloupe, Capt. E. K. Smith; Los Nogalos, Sonora, Capt. Smith.

8. PSORALEA FLORIBUNDA Nuttall.

Psoralea floribunda Nutt.; Torrey and Gray, Flora N. Am. 1: 300 (1838). Types (Nuttall) in Herb. Columbia College and (Pitcher) in Herb. Acad. Phila.

Erect 3 dm. to over 1 m. high, profusely branching, canescent, not glandular; petioles 5 mm. to 3 cm. long, mostly shorter than the leaflets; stipules 3–7 mm. long, subulate, sometimes reflexed; leaves 3–5 sometimes 7-foliolate; leaflets 1–3½ cm. or more long, 3–8 mm. wide, oblong, glandular on both surfaces, glabrous, rugose, with a few scattered hairs above, canescent with closely appressed white hairs beneath; peduncles 6–14 cm. long; spikes oblong or cylindrical, densely many flowered, the flowers at length interrupted and appearing almost as if whorled; bracts 2–3 mm. long, lanceolate, hirsute; calyx canescent, the lobes triangular, acute, the lower one the longest; pod ovoid, glabrous, light brown, covered with darker glands, beak short, stout, straight; seed 5 mm. long, compressed.

Montana—Belt Mts., Scribner, No. 25.

Wyoming—Laramie River, R. B. Hetz (1864).

Nebraska—Hayden (1853); Fort Pierre, Hayden (1853); Lancaster Co., Webber (1874).

Illinois—Pekin, Buckley; Carlisle, Buckley (1838); Augusta, S. B. Mead (1844), a specimen in Herb. Torrey with very long leaves and more slender inflorescence; Athens, Elihu Hall; H. H. Babcock.

Kansas—Miami Co., J. H. Oyster, No. 2146 (1883); Topeka, B. B. Smyth, Nos. 315 and 345 *b.* (1888 and 1890); Fort Riley, E. E. Gayle, No. 487 (1892); Hiawatha, A. S. Hitchcock.

Missouri—Cass Co., G. E. Broadhead (1863); Upper Missouri, Beck; Franklin, Th. Meehan (1871); Courtney, B. F. Bush (1891).

Colorado—Platte River, Coulter (1873).

Mississippi—N. Riehl (1846).

Maryland—Jackson Co. (1864), collector unknown.

Arkansas—Nuttall (type); Pitcher; Abert (1840); Leavenworth; between Illinois River and Neosho River, Engelman, No. 1059 (1835).

Indian Terr.—Between Fort Cobb and Fort Arbuckle, Palmer, No. 103 (1868).

Texas—Lindheimer, Nos. 157 and 373; Reverchon in Curtiss N. Am. Pl. No. 566; Wright.

New Mexico—Wright Nos. 968 and 969; Council Grove, Wislizenus, No. 415 (1846).

Arizona—Sta. Rita Mts., Pringle, No. 282 (1881).

Mexico—Berlandier, No. 1749.

9. PSORALEA LINEARIFOLIA Torr. and Gray.

Psoralea linearifolia Torr. and Gray, Fl. N. Am. 1: 300 (1838). Type in Herb. Gray.

Erect, 3–6 dm. high, widely branching; stems not always glandular, glabrous or sparingly pubescent with appressed hairs; stipules 3–7 mm. long, lanceolate or setaceous; leaves sessile or short-petioled, 1–3-foliolate; leaflets 2–6 cm. or more long, 2–3 mm. wide, linear, rugose, glandular, glabrous or with a few appressed hairs; peduncles 8–18 cm. long; flowers blue, loosely scattered, 1–4 together on slender pedicels 4–8 mm. long; bracts 2 mm. long, ovate, acuminate; mature calyx campanulate, 4 mm. long, glandular, slightly pubescent, the lobes nearly equal; pod 8 mm. long, ovoid or oblong, glandular, with a short, stout, straightish beak; seed flat, oblique, dark brown.

Nebraska—Kearney, Mrs. A. A. Austin; Cañon near North Fork of the Platte River, Rydberg (1890).

Indian Terr.—Between Fort Cobb and Fort Arbuckle, Palmer, No. 102 (1868.) Comanche Plains on the Upper Canadian, Bigelow (1853).

Texas—Near Dallas, Reverchon; Reverchon in Curtiss, N. Am. Pl. No. 263 *a*; E. Hall, No. 126 (1872); near Fort Concho, V. Havard (1881).

Arkansas—Beyrich (type 1834).

PSORALEA LINEARIFOLIA ROBUSTA Coulter, Contr. U. S. Nat. Herb. No. 2: 34 (1890). A broader-leaved more robust form of the type.

Texas—Clarendon, Donley Co., Neally (1888.)

10. PSORALEA DIGITATA Nuttall.

Psoralea digitata Nutt.; Torr. and Gray Fl. N. Am. 1: 300 (1838). Type in Herb. Columbia College.

Psoralea campestris Nutt.; Torr. and Gray Fl. N. Am. 1: 301 (1838). Type in Herb. Columbia College.

Erect, branching, 3–6 dm. or more high, appressed canescent-hirsute throughout; stipules 5mm.–1 cm. long, lanceolate, sometimes reflexed; leaves mostly 5-foliolate (the upper ones sometimes 3-foliolate); pedicels rarely longer than the leaflets; leaflets 2–3½ cm. long, the largest 5 mm. wide on petioles 3–6 cm. long, rough, with a few dark glands and the midvein pubescent above, densely pubescent with white appressed hairs beneath; peduncles 18–20 cm. long; flowers in interrupted spikes; bracts obcordate, 5 mm. long, nearly as broad, sparingly glandular; calyx much enlarged in fruit, the lower lobe the longest; pod entirely enclosed in the calyx, hirsute, beak slender, straight; seed ovoid, grey, nearly 5 mm. long.

Dakota—Black Hills, W. H. Forwood.

Nebraska—Platte Plains, Nuttall (type of *P. campestris*); Upper Platte, Hayden (1853); Rydberg, No. 51 (1891).

Kansas—T. H. Oyster, No. 2125 (1887).

Arkansas—Red River, Nuttall (type); Beyrich (1834), Leavenworth.

Indian Terr.—Canadian River, Gordon, No. 11 (1848); between Fort Cobb and Fort Arbuckle, Palmer, No. 101 (1868); Canadian River, Bigelow (1853–4).

Texas.—Capt. Pope; Dallas, Reverchon in Curtiss N. Am. Pl. No. 553*; Dallas, Elihu Hall, No. 123 (1872).

Oklahoma Terr.—Kingfisher, M. A. Carleton, No. 184 (1891).

11. PSORALEA ARGOPHYLLA Pursh.

Psoralea argophylla Pursh, Fl. Am. Sept., 475 (1814). Type in Herb. Acad. Phila.

Psoralea incana Nutt. Fras. Cat. (1813), name only. Type in Herb. Acad. Phila.

Psoralea argophylla var. *decumbens*, A. Gray, Pac. R. R. Rep. 12: 41 (1860).

Roots thickened, rhizome often 30 cm. or more long, stems erect, 3–5 dm. or more high, branching, silvery canescent throughout; stipules ½–1 cm. or more long; petioles as long or somewhat longer than the leaflets; leaves 5-foliolate; leaflets 1½–4 cm. long, 6 mm. –2 cm. broad, oblong, or oblong-cuneate, obtuse or sometimes mucronulate, more or less canescent with silky white hairs on both surfaces, with a few scattered small black glands; peduncles much longer than the leaves; flowers two or three together in an interrupted raceme or spike; bracts ovate-lanceolate, acute 5–8 mm. long; calyx-lobes acuminate, the lower one over 1 cm. long and longer than the ovate straight beaked pod; seed flat, 4 mm. long, brownish.

North West Terr.—Moose Mt., Macoun (1880); Souris Plain (Assiniboia), Macoun (1887); Saskatchawan, Bourgeau (1857–8); Saskatchawan Plains, Macoun, No. 416; St. Peter's, Parry; Nicollet.

Montana—Elliott Coues (1874); Stendive, L. F. Ward (1883).

Dakota—Black Hills, W. H. Forwood; Glatfelter.

Minnesota—Dr. Sykes (1849); Upper Missouri River, Parry (1848); St. Anthony Falls, Torrey; Falls of St. Anthony, Dr. Houghton, No. 63; St. Anthony, T. J. Hale (1861); St. Peter's River Hall (1861); Fort Snelling, Hall (1861); Minnehaha, H. H. Babcock (1872); Winnebago City, H. W. Babcock (1871); Minneapolis, Sandberg, No. 278 (1891); Hennepin Co., Sandberg (1890); Fort Snelling, Mearns, No. 244 (1890).

Wisconsin—St. Croix, T. J. Hale (1861).

Iowa—C. C. Parry (1847); A. Commons; Emmet Co., R. J. Cratty; Ames, A. S. Hitchcock.

Nebraska—F. V. Hayden (1853); Fort Kearney, H. Engelmann (1858–9); Big Nemahah River to Fort Kearney, Fendler (1849); Ogalalla, Earle (1880); Fort Niobrara, Fisher (1889);

Wilcox (1888); Saunders Co., Rydberg (1889); Kearney, Jesse H. Holmes (1889); Valentine, J. M. Bates (1889); G. D. Swezey, No. 22.

Utah—Capt. Bishop (1872).

Kansas—Fort Riley, Gayle, No. 546; (1892); Good Land, Smyth, No. 337 (1892); Manhattan, Phoebe Haines.

Missouri—Pursh (type); Nuttall; Little Muddy River, Buckley; Th. A. Culbertson (1850); Franklin, Th. Meehan (1871).

New Mexico—Fendler, No. 123 (1847); Cimarron River, Fendler, No. 137 (1847); also Fremont's 3d Expedition, No. 15 (1845).

12. PSORALEA REVERCHONI S. Wats.

Psoralea Reverchoni S. Wats. Proc. Am. Acad. **21**: 447 (1886).

Erect, branching, 6 dm. or more high, pubescent, the upper portion hirsute with appressed white hairs; stipules subulate, nearly equalling the petioles; petioles shorter than the leaflets, leaves 3–5-foliolate; leaflets 1½–3½ cm. long, linear-oblong, acute at each end; flowers few in short, close spikes; bracts 1½ cm. long, broadly ovate, cuspidate with a cordate base, pubescent and covered with brown glands; calyx 1–1½ cm. long, gibbous, glandular, hirsute, ciliate with white hairs, the lobes lanceolate, the lower one the longest. Fruit not seen.

Texas—Johnson Co., Reverchon, Curtiss N. Am. Pl. 553 **; Hood Co., Reverchon (type).

Indian Terr.—Between Fort Cobb and Fort Arbuckle, Palmer, No. 72 (1868).

13. PSORALEA CYPHOCALYX A. Gray.

Psoralea cyphocalyx A. Gray, Bost. Journ. Nat. Hist. **6**: 172 (1850). Type in Herb. Gray.

Psoralea palmata Buckley, Proc. Phila. Acad. 451 (1861). Type in Herb. Acad. Phila.

Caudex dilated below the summit into a globular tuber nearly 2 cm. in diameter; stem 8 dm. or more high, erect, strigose-pubescent, somewhat paniculate above; stipules linear, 1 cm. or less long; leaves 3–5-foliolate, lower petioles as long as the leaflets; leaflets 4–10 cm. long, 8 mm. wide, lanceolate-linear, glandular, glabrous and rugose above, sparingly appressed strigose-pubescent beneath; flowers scattered on a short spike; pedicels nearly 5 mm. long; bracts ovate, cuspidate, about the length of the pedicels; calyx pubescent, conspicuously ciliate with white hairs,

covered with brown glands, strongly gibbous-saccate at the upper side, lobes lanceolate, the upper ones the longest. Fruit not seen.

Texas—Lindheimer, Nos. 30, 593 (1847), also No. 44 (1849–50); Ch. Wright, No. 114 (1849); Bandera, Reverchon, No. 1512; Reverchon, No. 813; South of Fort Belknap, Buckley (1861).

The last specimen has very broad leaves, over 15 cm. long, foliaceous stipules and broad scarious scales at the base of the stem.

14. PSORALEA CANESCENS Michx.

Psoralea canescens Michx. Fl. Bor. Am. **2**: 57 (1803). Type in Herb. Michx.

Erect from a long, (rarely 1 m.) fusiform, somewhat farinaceous root, branching, canescent; stipules lanceolate, subulate, less than 1 cm. long; basal leaves 3-foliolate, upper ones often 1-foliolate, sessile or short petioled; leaflets orbicular-obovate narrowed to the petiole, 2–5 cm. or more long, minutely glandular, glabrous above except the somewhat hairy midvein, appressed canescent beneath; peduncles about twice as long as the leaves; flowers in small clusters or scattered in loose spikes; bracts 4–6 mm. long, ovate, acuminate; calyx gibbous on the upper side, covered with brown glands, the lobes triangular, ovate, the two upper ones much shorter than the lower; pod 1 cm. long, glandular, with a straight beak that is somewhat longer than the calyx; seed nearly orbicular, flattish, brown.

North Carolina—M. A. Curtis (1842).

South Carolina—Aikin, Ravenel.

Georgia—Beyrich; Baldwin; Leconte; Buckley; Neisler.

Florida—Buckley; Torrey; between Tallahassee and St. Marks, Rugel (1843); Rosewood, Garber (1876); Chapman; Burrows; pine barrens, Mary Reynolds (1876); near Braidentown, J. H. Simpson (1891); near Jacksonville, Curtiss, N. Am. Pl. No. 557.

Alabama—Ch. Mohr (plants with abnormally large fruit).

15. PSORALEA CUSPIDATA Pursh.

Psoralea cuspidata Pursh, Fl. Am. Sept. 741 (1814). Type in Herb. Acad. Phila.

Psoralea macrorhiza Fras. Cat. (1813), name only.

Psoralea cryptocarpa Torr. and Gray, Fl. N. Am. **1**: 301 (1838).

Psoralea Rœmeriana Scheele, Linnæa, **21**; 463 (1848).

Erect, 4–6 dm. or more high, stout, branching, glabrous below, more or less canescent above; stipules 1–2 cm. long, lanceolate-subulate; leaves 5-foliolate on petioles not longer than the leaflets; leaflets 2–4 cm. long, elliptical-oblong, glandular, glabrous above, canescent beneath; flowers short-pedicelled, crowded in short dense, 3–5 cm. long spikes on peduncles that are longer than the leaves; bracts 1½–2½ cm. long, lanceolate, cuspidate, exceeding the glandular calyx; calyx ciliate or gibbous on the upper side, wide at the sinuses, the two upper lobes shorter than the attenuate, triangular-lanceolate lower ones; pod glabrous, about 8 mm. long, with a short recurved beak, entirely enclosed in the calyx; seed elliptical, 5 mm. long, black or brownish, shiny.

North West Terr.—St. Peter's, Parry (1848); Nicollet, No. 170 (1839).

Dakota—" Upper Missouri River," Buckley (1853).

Kansas—Smoky Hill Fork, Parry, No. 34 (1867); Morton Co., M. A. Carleton, No. 148 (1891); Guerney (1891).

Nebraska—Mouth of the Yellowstone, Hayden, No. 407 (1854).

Indian Terr.—Plains of the Canadian, Bigelow.

Arkansas—Leavenworth.

Texas—Buckley, Drummond, No. 124; Industry, Lindheimer, No. 198 (1844); also No. 372 and 340 (1845); Austin, E. Hall, No. 122; Dallas Co., Reverchon in Curtiss, N. Am. Pl. No.563 **.

New Mexico—Ch. Wright (1851); Cimarron River, on the Santa Fé road, Wislizenus, No. 450 (1846); also Frémont, No. 171 (1845), no locality.

16. Psoralea pentaphylla L.

Psoralea pentaphylla L. Sp. Pl. 764 (1753).

Decumbent or assurgent, from long and tuberous root-stocks, stems branching from the base, 1–2 dm. or more long, glandular and more or less hirsute, with short rigid appressed white hairs; petioles 3–5 cm. long; stipules 3 mm. long, lanceolate; leaves 3–5-foliolate; leaflets 1–2½ cm. long, 3–7 mm. wide, lanceolate, sparingly hirsute on both surfaces, less so above; peduncles much shorter than the leaves; flowers 3–8 together in capitate racemes; bracts minute, ovate; calyx-lobes lanceolate, acute; pod over 1 cm. long, hirsute, the straight beak fully half the length of the pod: seed 5 mm. long, elliptical or nearly orbicular, grayish.

Mexico—Near San Luis Potosi, Shaffner, No. 833; Hartweg, No 62; San Luis Potosi, Parry and Palmer, No 142; near Chihuahua, Pringle, No. 17.

17. PSORALEA ESCULENTA Pursh.

Psoralea esculenta Pursh, Fl. Am. Sept. 475 (1814). Type in Herb. Acad. Phila.

Psoralea esculenta Fras. Cat. (1813), name only.

Psoralea brachiata Douglas; Hooker Fl. Bor. Am. 1: 137, *t. 53* (1829).

Root fusiform, 5 cm. or more long, not farinaceous; stems erect, spreading or assurgent, 1–3 dm. high, sometimes acaulescent, with a few scarious scales below, hirsute with somewhat weak hairs; stipules 2 cm. or more long, ovate-lanceolate, ciliate, rarely foliaceous; petioles longer than the leaflets; leaves 5-foliolate; leaflets 2–6 cm. or more long, 1–2½ cm. wide, oblong-cuneate, obtuse or acutish, sometimes mucronulate, glabrous above, hirsute beneath; flowers crowded in oblong spikes 3–8 cm. long on peduncles mostly much longer than the leaves (rarely only as long); bracts 1–1½ cm. long, ovate-lanceolate, cuspidate, hirsute; calyx-lobes 1–1½ cm. long, foliaceous, hirsute, becoming coriaceous with age, the tube strongly gibbous on the upper side, the two upper lobes shorter than the lower ones; pod enclosed in the calyx, hirsute, with the beak nearly 3 times as long as the 6 mm. long black seed.

The Pomme de Prairie and Pomme blanche of the Canadian voyageurs.

Saskatchawan—Bourgeau (1858).

Northwest Terr.—Moose Mt., Macoun; Parry (1848); Nicollet, No. 169.

Montana—Tweedy (1889).

Iowa—Emmet Co., Cratty.

Wisconsin—Black Earth, Hale (1861); Arena, Hale; Dane Co., J. A. Lapham (1858).

Nebraska—From Niobrara River to Fort Pierre, Hayden (1859); Sage Creek, Hayden (1859); Bad Lands, Hayden (1853); Fort Clark, Hayden (1856); Omaha, Smech (1893); Ellenwood, T. A. Williams; Kearney, Mrs. A. A. Austin; Fort Niobrara, Wilcox; Lancaster Co., Webber.

Missouri—Nuttall; Willard; T. A. Culbertson (1850); G. C. Broadhead (1873); Potosi, Riehl (1846); Allentown, G. W. Letterman (1875); Buckley.

Kansas—Manhattan, Bertha Hederstrow (1892); Fort Riley, E. E. Gayle (1892); Topeka, B. B. Smyth, No. 341 (1891); Manhattan, Kellerman (1888).

Minnesota—Upper St. Peter's, C. C. Parry (1848); Cannon Falls, Sandberg, No. 344 (1891).

Indian Terr.—M. A. Carleton, No. 112 (1891).

Dakota—Box Elder Creek, Rusby (1887).

Texas—Ch. Wright; Dallas, Reverchon; Elihu Hall, No. 121; Hempstead, Elihu Hall, No. 128 (1892); Freestone Co., J. Joor, No. 15 (1878); Prairies of the Rio Grande, Emanuel Meyer; near Nagadoches, Leavenworth; Parry.

Louisiana—Camp Sabine, Leavenworth (1837).

18. PSORALEA HYPOGÆA Nutt.

Psoralea hypogæa Nutt.; Torr. and Gray, Fl. N. Am. 1: 302 (1838). Type in Herb. Columbia College.

Psoralea hypogæa var. *scaposa* A. Gray, Bost. Journ. Nat. Hist. 4: 175 (1850). Type in Herb. Gray.

Roots ovoid, globose or fusiform, 3–4 cm. long, the whole plant sometimes 10 cm. high; stem with a few scarious scales; petioles usually much longer than the leaflets; leaves 5–7-foliolate; leaflets 2–5 cm. long, 5–7 mm. wide, linear-lanceolate, or linear-oblong, acutish, glabrous or with a few scattered hairs above, appressed white hirsute beneath; flowers in capitate racemes varying from nearly sessile to somewhat exceeding the leaves; bracts scarious, ovate, acute, hirsute; calyx-lobes lanceolate, cuspidate, hirsute, the two upper lobes shorter than the lower ones, the middle one of which is broadly lanceolate; pod over 1 cm. long, somewhat hirsute, with a long slender attenuate beak; seed ovoid, about 5 mm. long, wrinkled, reddish brown.

Differing from *P. esculenta* in its smaller size, more rigid and appressed hairs, and narrower leaflets. The pubescence of *P. esculenta* is silky, often nearly woolly and more spreading.

Nebraska—Platte Plains, Nuttall (type).

Indian Terr.—Canadian River, Gordon (1848).

Colorado—Colorado Swamps, Jones, No. 934, (1879); Sandy Plains, Greene (1872).

Texas—West of the Brazos River, Reverchon; Lindheimer, No. 594; Wright, No. 115; Parry (1867), labelled *P. esculenta;* Wright, No. 115 (1849), labelled var. *scaposa;* near Austin, Buckley (1860).

New Mexico—Upper Canadian, A. Gordon (1848); Cold Spring, South of Cimarron River, Wislizenus, No. 478 (1846).

19. PSORALEA SUBACAULIS Torr. and Gray.

Psoralea subacaulis Torr. and Gray, Fl. N. Am. 1: 302 (1838). Type apparently lost.

Nearly acaulescent, 1–2 dm. high from a long subterranean stem, root oblong-fusiform, tuberous, 5–11 cm. long; stem and base of plant covered with large, yellowish, scarious scales; petioles and peduncles villous with silky white spreading hairs; leaves 5–7-foliolate; stipules 1–2 cm. long, ovate-lanceolate; leaflets 1½–3 cm. long, 6–8 mm. wide, obovate-oblong, obtuse or acutish, minutely glandular, glabrous except the ciliate margins and the appressed white-hirsute midvein beneath; peduncles as long or longer than the leaves; flowers purple; bracts ovate-lanceolate, 1–1½ cm. long, ciliate; calyx densely hirsute with white hairs, the lower lobe spatulate, obtuse, the others acutish and shorter. Fruit not seen.

Tennessee—Near Nashville, Gattinger, in Curtiss, N. Am. Pl., No. 559, from the original* locality, where Dr. Roane first collected it; near Nashville, Lesquereux (1855); near Nashville, G. H. Hubbard, No. 559 (1880).

20. PSORALEA CALIFORNICA S. Wats.

Psoralea Californica S. Wats. Proc. Am. Acad. 12: 251 (1876). Type in Herb. Gray.

Psoralea mephitica S. Wats. Proc. Am. Acad. 14: 291 (1879). Type in Herb. Gray.

Root ligneous, 10 cm. or more long; stems 1–2 dm. high, often several from the same root, with a few scarious scales, apparently acaulescent, but spreading or decumbent, sometimes branching from the base, villous with more or less spreading white hairs, especially so on the inflorescence; stipules broadly ovate, scarious; leaves 5-foliolate, on petioles 5–10 cm. long; leaflets 2–3 cm. long, 1–2 cm. wide, rhomboid-obovate or cuneate-obovate, obtuse or retuse, sometimes apiculate, more or less pubescent on both surfaces with appressed short white hairs;

* Torr. & Gray Fl. N. Am. 1: 302.

peduncles somewhat shorter than the petioles, 2–3 cm. long; flowers on slender lax pedicels, in dense, capitate or elongated spikes; bracts ovate, long-acuminate, scarious, but little shorter than the calyx; calyx conspicuously villous with spreading hairs, somewhat gibbous above, the lobes lanceolate, 8–10 mm. long, the lower lobe the broadest; pod scarious, 1 cm. long, somewhat villous, with a straight slender beak; seed about 5 mm. long, ovoid, greenish or black, smooth and shining.

California—McGinnis Ranch, head of Salinas River, Palmer (1876) type; San Rafael Mts., Santa Barbara Co., H. C. Ford (1887); Head waters of Eel River, Lake Co., Volney Rattan, No. 12 (1884); base of mountains, Mojave region, S. B. & W. F. Parish, No. 1284; Lake Co., M. K. Curran (1884); Mt. Diablo, Geo. W. Davidson (1892); Mt. Diablo, Greene (1892).

Lower California—Japa, Orcutt (1884).

Arizona—Peach Springs, Lemmon, No. 4146 (1884); Buckskin Mts., Jones (1891); Navajo Springs, Jones (1890).

Utah—Beaver City, Palmer, No. 97 (1877); Mrs. Thompson (S. Utah, 1872); Garfield Co., A. L. Siler (1883).

Colorado—Westwater, alt. 4,500 ft., Jones (1891).

21. PSORALEA CASTOREA S. Wats.

Psoralea castorea S. Wats. Proc. Am. Acad. **14**: 291 (1879). Type in Herb. Gray.

Root ligneous, about 8 cm. long; stem erect, 10–15 cm. high with a few scarious scales, the whole plant covered with closely appressed rigid white hairs; stipules ovate-lanceolate, scarious, persistent; petioles 8–10 cm. or more long; leaves 3–5 foliolate; leaflets 3–5 cm. long, 2–5 cm. wide, cuneate-obovate, rounded, retuse or acutish; peduncles shorter than the petioles; flowers in dense capitate spikes about 3 cm. long; bracts ovate or lanceolate, acute, less than 5 mm. long; calyx slightly gibbous above, the four upper lobes lanceolate, attenuate, nearly as long as the cuneate or spatulate lower one, which is over 1 cm. long; pod 8 mm. long, the attenuate beak 14–15 mm. longer; seed about 7 mm. long, flattened, transversely wrinkled, light brown.

In the original description the large lower calyx-lobes have been mistaken for bracts. It differs mainly from *P. Californica* in its closer, whiter pubescence, the size of the bracts, which in the specimens seen were not scarious, the shape of the calyx-lobes, the pod, which again is not scarious and has a much longer and more slender beak, and the wrinkled seed

Prof. M. E. Jones* claims that *P. castorea* and *P. mephitica* are identical, in which I can hardly concur, as the series of specimens examined seem to be very constant to the characters noted above.

Utah—Beaver City, Palmer, No. 96 (1877), type.

California—Mojave River, Parish Bros., No. 1283 (1882); Mojave Desert, Lemmon, No. 3119 (1884); near Colico, Mojave Desert, Lemmon (1884).

§ 2. LEAVES PINNATELY 3-FOLIOLATE (RARELY UNIFOLIOLATE).

Flowers in capitate or short, crowded, oblong spikes.

Flowers small (5 mm. or in *P. simplex* often 1 cm. long).

Pods obliquely orbicular, transversely reticulate or wrinkled.

Leaves 1-foliolate, leaflets linear-lanceolate, bracts setaceous. *22. P. virgata.*

Leaflets and bracts lanceolate and pubescent. *23. P. simplex.*

Pods ovoid, not reticulate.

Plant low, branches trailing. *24. P. rhombifolia.*

Plant erect, leaflets ovate or orbicular, crenate-dentate. *25. P. Americana.*

Flowers large (1–2 cm.).

Plants glabrous or nearly so.

Flowers few, slender pedicelled; pods obliquely ovate, reticulate, stems trailing. *26. P. melanocarpa.*

Flowers in crowded heads; pods ovate, rough, hardly wrinkled. *27. P. rigida.*

Pods ovate, membranaceous, calyx inflated in fruit. *28. P. physodes.*

Leaflets elliptical, stipules large and foliaceous. *29. P. stipulata.*

Plants more or less tomentose or densely pubescent throughout; bracts 15 mm. long, broadly ovate. *30. P. strobilina.*

Flowers in more or less elongated cylindrical spikes.

Flowers small (5 mm.); plants glabrous or nearly so; pods transversely wrinkled.

Leaflets 5 mm.–2 cm. broad, pods nearly 5 mm. long, nearly orbicular. *31. P. pedunculata.*

Leaflets 2½–6 cm. broad; pods nearly 1 cm. long, obliquely ovate, roughened with conical tubercles. *32. P. Onobrychis.*

Flowers large (1–3 cm.).

Plants glabrous or nearly so, stems conspicuously roughened with elevated glands. *33. P. glandulosa.*

Stems glabrous, inflorescence conspicuously villous with white hairs. *34. P. macrostachya.*

Stems prostrate, leaves orbicular or nearly so, very long petioled; infloresence elongated, hirsute. *35. P. orbicularis.*

*Zoë 2: 244 and 3: 285.

22. PSORALEA VIRGATA Nutt.

Psoralea virgata Nutt. Gen. 2: 104 (1818). Type in Herb. Columbia College.

Psoralea simplicifolia Baldw.; Torr. and Gray, Fl. N. Am. 1: 303 (1838.) Type in Herb. Acad. Phila.

Root small, tuberous; stem erect, 2–6 dm. high, angled, simple or branching from the base, nearly glabrous or the upper part pubescent; stipules setaceous, 5–8 mm. long; leaves remote, 1-foliolate or the radical ones 3-foliolate; petioles shorter than the leaflets; leaflets 3–10 cm. long, 4–10 mm. wide, linear, the basal ones rarely ovate or ovate-lanceolate, glandular, sparingly pubescent on the veins and margins; flowers crowded in short spikes 2–3 cm. long; bracts subulate, nearly twice as long as the calyx-lobes; calyx very small, hirsute, the lower lobe the longest; pod 5 mm. long, obliquely orbicular, compressed, transversely wrinkled, with a minute recurved beak; seed flattish, brown.

Georgia—Near St. Mary's, Baldwin (type).

Florida—Between St. John's and St. Augustine, Rugel, No. 164 (1848). Chapman, no locality; near Jacksonville, Curtiss, No. 553; C. T. Powell (1872); St. Augustine, Mary Reynolds.

Also specimens in Herb. Acad. Phila. from Herb. Baldwin, labelled "*Psoralea angustifolia* U. S. 228. Leaves rarely ternate."

23. PSORALEA SIMPLEX Nutt.

Psoralea simplex Nutt.; Torr. and Gray Fl. N. Am. 1: 303 (1803). Type in Herb. Columbia College.

Erect, simple or one or two stems from the same root, 3–6 dm. high, more or less pubescent throughout; stipules 1 cm. long, setaceous; leaves 3-foliolate, sessile or very short-petioled; leaflets 2–6 cm. long, 5–12 mm. wide, lanceolate, acute, mucronate, glandular; peduncles 2–3 times the length of the leaves; flowers in oblong spikes; bracts very small, linear-lanceolate, acuminate, hirsute with white hairs; calyx hirsute, the lobes somewhat obtuse, the lower one the longest; pod 4–5 mm. long, obliquely orbicular, transversely reticulate; beak somewhat oblique; seed flat, very small, brownish.

Arkansas—Cedar Prairies, Red River, Nuttall (type); Dr. Edwards (1854); Engelmann (1835).

Louisiana—Pointe à la Hache, Langlois (1886); Hale; Paroisse des Rapides, Steinhauer (1839).

"*South Mississippi*"—E. H. Gard. (1859).

Indian Terr.—Near Atoka, C. S. Sheldon, No. 60 (1891).

Texas—Drummond, No. 122 (1835); Wilground, Hempstead, Elihu Hall (1892); Rio de la Trinida y Bejax (1828) lab. *melilitoides.*

24. Psoralea rhombifolia Torr. and Gray.

Psoralea rhombifolia Torr. and Gray, Fl. N. Am. 1: 303 (1838). Type in Herb. Columbia College.

Decumbent or trailing (rarely erect) from a somewhat thickened root, angled below, sparingly pubescent above; leaves 3-foliolate, on petioles 2–4 cm. or more long, upper ones nearly sessile; stipules 3–5 mm. long, ovate or lanceolate; leaflets 8 mm. to 3 cm. long, ovate-rhomboid (when very small, nearly orbicular), the terminal one acutish, the lateral ones obtuse; flowers dark blue or reddish, in small capitate racemes, on peduncles 3–8 cm. long; bracts about 3 mm. long, elliptical, ciliate; calyx 8 mm. long, somewhat gibbous above, the lobes nearly equal, triangular, acute, spreading; pod mostly 1 cm. long, hirsute, with a long straight beak; seed elliptical, nearly 5 mm. long, brownish, roughened with minute darker glands or tubercles.

Texas—Lindheimer, No. 35 (1843), also 291 (1849–50); Dallas, Reverchon, No. 213 and 563* (1881); Corpus Christi Bay, Palmer, No. 223 (1880); Drummond, No. 134 (type); Ch. Wright; Hockley, F. W. Thuron (1891).

Mexico—Sierra Madre, forty miles east of Saltillo, Palmer, No. 254 (1880); Monterey, Palmer, No. 222.

25. Psoralea Americana L.

Psoralea Americana L. Sp. Pl. 763 (1753).

Psoralea dentata D.C. Prodr. 2: 221 (1825).

Psoralea corylifolia Britton, Bull. Torr. Bot. Club, 17: 313 (1890), not of Linn.

Somewhat shrubby at the base, erect, over 3 dm. high, branching, glabrous, glandular throughout; stipules lanceolate, acuminate; leaves 3-foliolate; petioles 4–6 cm. long; leaflets 2–3½ cm. long, the terminal one sub-orbicular, the lateral ones obliquely ovate, obtuse, irregularly crenate-dentate; racemes spicate, elongated, pubescent, much exceeding the leaves, or when young shorter and almost capitate; bracts lanceolate, shorter than the calyx; calyx-lobes pubescent, the lower one broader and longer than the two short upper ones; pod glabrous, barely longer than the calyx lobes; seed 3 mm. long, densely covered with minute glandular warts.

Florida—Apalachicola, Chapman.

In his description of this plant Linnæus gives America as its habitat. DeCandolle changed the name to *P. dentata*, and gives Madeira as its habitat. Kuntze, in Rev. Gen. Plant i. 193, notes that the plant undoubtedly grows wild on the island of Madeira, and therefore is not American, but re-establishes the Linnæan specific name, though under the generic name of *Lotodes*. The species has been collected in Florida, and doubtless the plant from which Linnæus made his original description came from one of the Southern States. It would be interesting to know how well it is established there. Dr. Chapman's plant is preserved in the Herbarium of Columbia College.

26. Psoralea melanocarpa Benth.

Psoralea melanocarpa Benth.; Hemsl. Biol. Centr. Am. 1: 234 (1879). Type in Herb. Kew.

Shrubby at the base; stems trailing or spreading, sparingly pubescent with appressed white hairs; stipules 6–10 mm. long, lanceolate, long-acuminate; leaves 3-foliolate; petioles 3–6 cm. long; leaflets, 4–7 cm. long, ovate-lanceolate, acute, mucronulate, glandular, nearly glabrous above, sparingly pubescent beneath; peduncles 12 cm. or more long, exceeding the leaves; racemes oblong; flowers few, slender pedicelled; bracts 6 mm. long, ovate, acuminate; calyx lobes linear, acuminate, nearly as long as the pod; pod obliquely ovate, somewhat twisted, transversely reticulate and somewhat tuberculate, beak short, recurved; seed 3–4 mm. long, elliptical, much smaller than the pod.

Mexico—Coulter, No. 561; Parry & Palmer, No. 142; near Montery, Pringle, No. 2275 (1888).

27. Psoralea rigida Parish.

Psoralea rigida Parish, Bull. Torr. Bot. Club, 19: 91 (1892).

Erect, 3–6 dm. high, glandular, sparsely villous, with short intermingled black and white hairs; petioles 2 cm. or more long; stipules lanceolate, leaflets ovate-lanceolate, 3–5 cm. or more long, glabrous, rigid; peduncles shorter than the leaves; flowers in capitate racemes; bracts lanceolate, much shorter than the flowers; calyx 1 cm. long, lobes acuminate, the upper one much the longest; pod 8–10 mm. long, ovoid, coriaceous, with a short, stout, straight beak (under a lens, with a few white hairs); seed elliptical, 7 mm. long, black.

California—Oak Grove, San Diego Co., Parish, No. 643 (1882).

28. PSORALEA PHYSODES Douglas.

Psoralea physodes Douglas; Hook. Fl. Bor. Am. 1: 136 (1830).

Erect, simple, 3–5 dm. high, glabrous or with a few weak, mostly black hairs; stipules 4–6 mm. long, lanceolate, reflexed; leaves 3-foliolate; leaflets 2½–5 cm. long, 2–3 cm. wide, broadly rhomboid-ovate, acute, mucronate, glandular; peduncles 3–9 cm. long; flowers in capitate racemes; bracts 5 mm. long, elliptical; calyx 8–10 mm. long, inflated, lobes triangular, glabrous, the margins ciliate with dark hairs; pod membranaceous, 5 mm. long, somewhat compressed (under a lens, with a few scattered black hairs), seed greyish.

British Columbia—Near Victoria, Fletcher (1885).

Oregon—Wahlamet, Nuttall; Portland, L. F. Henderson, No. 10; San Juan Island, Lyall (1858); Tolmie; E. Hall, No. 106 (1871); Douglas; Brushlands, Howell (1880).

Washington—Pugallup, Puget Sound, Engelmann (1880); J. M. Grant (1880); Port Townsend, Th. Meehan (1883).

California—Near Monterey, Brewer, No. 673; Gavillari Peak, Brewer, No. 752; Walnut Creek, Brewer, No. 1032; New Almaden, Torrey, No. 111 bis (1865); Samuels; Douglas; East of Cascade Mountains, Wilkes, No. 454; near Auburn, Lemmon (1883); Oakland Hills, Bolander (1861); Mack West's Creek, Bigelow (1853–4); Bridges, No. 75; Monterey, Parry (1850).

29. PSORALEA STIPULATA Torr. and Gray.

Psoralea stipulata Torr. and Gray, Fl. N. Am. 1: 688 (1840). Type in Herb. Columbia College.

Ascending, branching from the base, 3–5 dm. high, not glandular, nearly glabrous; petioles 2–3 cm. long; leaves 3-foliolate; stipules 1–1½ cm. long, foliaceous, lanceolate-ovate or elliptical; leaflets 3–4½ cm. long, ovate or elliptical, obtuse, mucronulate, reticulate beneath; peduncles about as long as the leaves; racemes capitate; bracts 5–10 mm. long, ovate, cuspidate, somewhat scarious, deciduous; calyx slightly pubescent, the lower lobe the longest. Fruit not seen.

Ohio—Falls of the Ohio, Rock Island, Wm. Jones (June 8, 1839, type); Rock Island, Short (1840–60).

Indiana—New Albany, A. Clapp.

In the collections of C. W. Short, preserved in the Herb. Acad. Phila., there are notes to the effect that he never found this plant

in fruit growing wild, and that he cultivated it vainly for years. His collections of *P. stipulata* in the herbaria examined, cover a period of some twenty years.

30. PSORALEA STROBILINA Hook. and Arn.

Psoralea strobilina Hook. and Arn. Bot. Beechey 332 (1840).

Psoralea macrostachya β Torr. and Gray, Fl. N. Am. 1: 304 (1838) not of D.C.

Stems 6–9 dm. high, striate, tomentose and glandular throughout; stipules over 1 cm. long, ovate, cuspidate, ciliate, somewhat scarious; petioles 3–6 cm. or more long; leaves 3-foliolate; leaflets 3–7 cm. long, ovate or oval, the terminal one somewhat rhomboid, acutish, sometimes obtuse, rarely mucronulate, pubescent above with black glands, tomentose beneath; peduncles exceeding the leaves; spikes 2–5 cm. long, oblong, densely hirsute; bracts over 1½ cm. long, broadly ovate, acuminate, hirsute, mostly enclosing the flower; calyx-lobes lanceolate, cuspidate, the lower lobes broader and longer than the attenuate upper ones; fruit not seen.

California—Douglas (type); Roadsides to Santa Cruz, Bolander; Oakland Hills, near San Francisco, Torrey, No. 113 bis.

31. PSORALEA PEDUNCULATA (Mill.).

Hedysarum pedunculatum Mill. Gardn. Dict. No. 17 (1768), not *Psoralea pedunculata* Ker, Bot. Reg. t. 228 (1817), which is *P. sericea* Poir. (1804.) Type in Herb. Mus. Br.

Trifolium psoralioides Walt. Fl. Car. 184 (1788). Type apparently lost.

Psoralea melilotoides Michx. Fl. Bor. Am. 2: 58 (1803). Type in Herb. Michx.

Psoralea Melilotus Pers. Syn. 2: 347 (1807).

Melilotus psoralioides Nutt. Gen. 2: 104 (1818).

Psoralea eglandulosa Ell. Bot. N. C. and Ga. 2:198 (1824).

Psoralea gracilis Chapm.; Torr. and Gray, Fl. N. Am. 1: 303 (1838). Type in Herb. Columbia College.

Erect, 3–8 dm. high, from a long rootstock, simple or branching from the base; stipules 4–5 mm. long, setaceous; petioles shorter than the leaflets; leaves remote,3-foliolate, rarely 4–5-foliolate; leaflets 4–7 cm. long, 1–2 cm. wide, lanceolate, acute, rarely ovate and obtuse, glabrous except the veins and margins, which are very sparingly hirsute; peduncles much exceeding the

leaves; flowers in loose spikes; bracts 1 cm. long, glandular, broadly ovate, much imbricated, the cuspidate apex longer than the flowers; calyx-lobes acute, glandular, the lower lobe the longest; pod 4 mm. long, 5 mm. wide, nearly orbicular, compressed, ransversely wrinkled with a minute recurved beak; seed orbicular, flat, brown.*

[There is a specimen of this plant in the Linnæan Herbarium in the place of *Hedysarum viridiflorum* L., as indicated on the sheet by Dr. Asa Gray. It is out of place, however; the specimen of *Hedysarum viridiflorum* on which Linnæus founded the species is the plant of Gronovius preserved in the Herbarium of the British Museum of Natural History, and is *Meibomia viridiflora* (L.) Kuntze. N. L. B.]

Washington—Seattle, Ch. V. Piper., No. 58 (1891).

Indiana—New Albany, A. Clapp.

Illinois—Rafinesque in Herb. Acad. Phila; Salem, W. S. Bebb; Maysville, Buckley (labelled "*eglandulosa*").

Missouri—Jefferson City, Knause (1869); Garden Gap, Frank Bush (1888); Paris Springs, J. W. Blankinship (1887).

Kansas—Cherokee Co., J. H. Oyster, No. 2133 (1887).

Virginia—Petersburg, M. Tuomey; near Suffolk, A. Heller, No. 959 (1893).

North Carolina—Near Salisbury, A. A. Heller, No. 30 (1890).

South Carolina—Beck (labelled *P. lanceolata*); Pine Barrens, near Society Hill, John Donnell Smith.

Georgia—Jessup Co., T. H. Kearney (1893).

Kentucky—Oaklands, Short; Big-hill, Madison Co., Short.

Tennessee—Near Dandridge, Rugel (1842, labelled *P. eglandulosa* Ell.).

Arkansas—Nuttall; F. L. Harvey, No. 13 (a monstrosity with foliaceous calyx-lobes in Herb. Gray; Pitcher.

Georgia—Baldwin; Leconte; S. H. Wright.

Louisiana—Hall; Carpenter (1841).

Alabama—Buckley (1847); Thomas W. Peters; La Grange, N. R. Hatch; G. R. Vasey (1878).

Florida—Chapman; between Quincy and Chattahoochee, Chapman (1836); Quincy, Chapman, (lab. var. *gracilis*).

Texas—Wright; (also, Wright sp., lab. *P. eglandulosa* in Herb. Gray); Denison, J. H. Oyster (1883).

32. Psoralea Onobrychis Nutt.

Psoralea Onobrychis Nutt. Gen. **2**: 104 (1818).

Stylosanthes racemosa Nutt.Fras. Cat. (1813), name only.

Psoralea (?) *latifolia* Torr. Ann. Lyc. N. Y. **2**: 176 (1828).

Erect, 1–1½ m. or more high, more or less finely pubescent throughout; petioles 4–7 cm. or more long; stipules 8–10 mm. long, setaceous; leaves 3-foliolate; leaflets 5–10 cm. or more long, 2½–6 cm. wide, ovate, acuminate, nearly glabrous above, ciliate, sparingly pubescent with scattered hairs beneath; peduncles much exceeding the leaves; spikes long, slender; flowers scattered, very small; bracts 3 mm. long, setaceous; calyx-lobes obtuse; pod 1 cm. long, ovate, black, slightly twisted at the apex, transversely reticulate, roughened with conical tubercles; seed elliptical, 6 mm. long, red brown.

Canada—Nicolet (1841); Near Ottawa, M. S. Bebb (1879).

Indiana—New Albany, A. Clapp.

Illinois—Peoria, A. J. Heading; Menard Co., Hall (1861); Athens, Hall (1863); Pekin, No. 8 (1837), collector unknown.

Ohio—Columbus, Sullivant (1840); Columbus, J. A. Lapham.

Missouri—Beck; H. Eggert (1877); near St. Louis, Baldwin; St. Louis, Engelmann (1841).

Tennessee—Between Dandridge and Knoxville, Rugel (1842); Knox Co., T. H. Kearney (1893).

Kentucky—High cliffs, Kentucky River, Short.

33. Psoralea glandulosa L.

Psoralea glandulosa L. Sp. Pl. Ed. 2, 1075 (1763).

Psoralea lutea Molina, Sagg. 163 (1782).

Psoralea Cullen Poir. Encycl. **5**: 685 (1804).

A low shrub, 1 m. or more high, glabrous (except the racemes), covered throughout with elevated black glands; leaves 3-foliolate, on petioles somewhat shorter or the length of the leaflets; leaflets lanceolate or ovate-lanceolate, acute, 3–5 cm. long, 1–1½ cm.

* In the Schweinitz Herbarium there is a specimen labelled *P. peduncularis* Raf. I have not been able to find a published reference to that name.

wide; stipules minute, subulate; racemes 10–15 cm. long, usually much longer than the leaves; bracts 3 mm. long, ovate, cuspidate; calyx-lobes conspicuously nerved, acute, glabrous, nearly equal; pods exceeding the calyx-lobes, elliptical, hirsute, with a short, straight beak; seed 5 mm. long, elliptical, brown.

Chili—Dr. Styles, near Santiago, Ball (1882); Reynolds; Capt. Wilkes (1838–42); Gay; Mertens; Gillies, No. 257; W. Lechler; Valparaiso, Wilkes; near Valparaiso, Rusby, No. 956; G. Kunze (1839); W. H. Statin (1884–85).

California—Near Berkeley, Greene (1881).

34. PSORALEA MACROSTACHYA DC.

Psoralea macrostachya D.C. Prod. 2: 220 (1825).

Erect, 3 dm. to 3 m. high, branching, the stems glabrous or nearly so, otherwise the pubescence very variable; stipules 3–4 mm. long, subulate; leaves 3–foliate; leaflets 2–8 cm. or more long, 1–7 cm. wide, ovate or ovate-lanceolate, acute, from nearly glabrous to cinereous-pubescent; glands scattered, black; peduncles 4–30 cm. or more long, glandular; spikes cylindrical; bracts 5 mm. long, ovate, cuspidate, scarious, soon deciduous; calyx densely villous with silky white hairs, the lower lobe attenuate and longer than the upper one; pod 8 mm. long, obliquely ovate, acute, pubescent, with a weak recurved beak; seed 4–5 mm. long, elliptical, black.

California—San Diego Co., San Filipe Cañon, Palmer, No. 63; San Bernardino, G. W. Wright, No. 162; Brewer, No. 679; Yosemite Valley, Torrey, No. 111 bis. (1865); Indian Springs, Nevada Co., G. W. Wright (1875); Douglas (with very pubescent, almost tomentose leaflets); Ray Cañon, near Shasta, Brewer, No. 1322 (leaflets varying from glabrous or cinereous to nearly tomentose); Ojai Ch. Creek, Rothrock, No. 172 (1875); Sacramento River, Wilkes, Nos. 1297 and 1632 (labelled var. *rhombifolia*); Frémont (1843–47); Parry and Lemmon, No. 84 (1876); Palmer No. 69 (1875); San Filipe, Southern San Diego Co., Palmer No. 63 (1875); San Luis Rey, Parry, (1850); Colorado Desert, Orcutt, (1889); W. R. Prince (1854); Thomas Bridges, No. 74.

Lower California—Santo Thomas, Orcutt (1885); All Saints Bay, Miss F. E. Fish (1882); San Bernardino, S. B. and W. F. Parish, No. 1075 (1881); Wislizenus (1851).

35. PSORALEA ORBICULARIS Lindley.

Psoralea orbicularis Lindley, Bot. Reg. **23**: t. 1971 (1837).

Stem prostrate, creeping, the leaves and racemes erect, glandular throughout; stipules ovate, inconspicuous; leaves 3-foliolate; petioles 2–5 dm. long; leaflets 3–8 cm. long, 3–7 cm. wide, the terminal one nearly orbicular, the lateral ones obovate and obtuse, glabrous and reticulate or pubescent, entire or rarely with broad undulate lobes; peduncles mostly exceeding the leaves; flowers in dense, hirsute spikes, 5–30 cm. long; bracts 1–1½ cm. broad, oblong-lanceolate, scarious, ciliate; calyx-lobes lanceolate, attenuate, the lower lobe often 2 cm. long; pod about 8 mm. long, somewhat inflated, hirsute, with a very small straight beak; seed elliptical, light brown.

California—Wallace (1858); Douglas; Pratten; Bolinas Bay, Kellogg (1866), labelled "*P. rotundifolia;*" Yosemite Valley and mountains, Torrey, No. 112 bis (1865); Brewer; Sprague's Ranch, Yosemite, Lemmon; Indian Spring, Nevada Co., G. W. Wright (1875); Upper Sacramento, Wilkes (1838–42); Sonoma Co., E. Samuels; Vasey (1875); Cuiamaca Mts., southern part of San Diego Co., Palmer, No. 64 (1875); Monterey, Major Rich; Southern Upper California, A. Fitch; Mr. Shelton; "Near American Fork," Frémont, No. 496 (1846); San Bernardino Valley, S. B. and W. F. Parish (1887).

PSORALEA MULTIJUGA Ell. Bot. S. C. and Ga. **2**: 198 (1824).

The type specimen of this species preserved in Elliott's herbarium at the College of Charleston, Charleston, S. C., was examined by Dr. Britton and Mr. Small in January, 1894, and proved to be *Astragalus glaber* Michx.

Additional Mexican species of which I have not seen specimens and to which I have not been able to see the descriptions or find satisfactory reference.

PSORALEA HUMILIS Mill. Gard. Dict. (Ed. 8), No. 7—Mexico.

PSORALEA SPINESCENS Benth.—Mexico. (No other citation in manuscript of Kew Index.)

SOUTH AMERICAN SPECIES.

PSORALEA AZUREA R. Philippi, Fl. Ataca. **14**: (1860). Chili.

PSORALEA BRACHYSTACHYA. Spruce, No. 5145 (1857–9). Andes of Ecuador, name apparently unpublished.

PSORALEA DIVARICATA H. and B.; Willd. Enum. 788 (1809). Peru.

PSORALEA HIGUERILLA Gillies; Hook. and Arn., in Hooker, Bot. Misc. **3**: 181 (1838). Argentine Republic.

PSORALEA LASIOSTACHYS Vogel, Nov. Act. Acad. Cur. **19**: Suppl. **1**: 13 (1843). Peru, and probably also Bolivia.

PSORALEA MARGINATA Meyen, Reise, **1**: 436. Peru.

PSORALEA MEXICANA (L.)

Indigofera Mexicana Linn., Suppl. 335 (1781).

Psoralea Mutisii Kunth, Plant. Legum. **1**: 91, t. 54 (1819–24), fide H. B. K. **6**: 487 (1823). New Grenada.

PSORALEA PUBESCENS Pers. Syn. Pl. **2**: 347 (1807). Peru and Ecuador.

PSORALEA TRIANÆ n. sp.

Shrubby, slender, stems tomentose; stipules 6 mm. long, lanceolate, tomentose in the exterior; leaves 3-foliolate; petioles mostly shorter than the leaflets; leaflets 3–5 cm. or more long, lanceolate-oblong, acuminate, glandular, nearly glabrous above, tomentose beneath; flowers in interrupted cylindrical spikes exceeding the leaves; bracts 5 mm. long, ovate, densely covered on the outer surface with dark hairs, as well as the calyx; calyx 3–5 mm. long, the lobes acute; pod not seen.

New Grenada—Near Pasto, alt. 2,500 m., J. Triana (1851–1857).

PSORALEA WEDDELLIANA Baillon, Adansonia, **9**: 292 (1868–70) Brazil.

This study was begun at the suggestion of Dr. N. L. Britton, and I am indebted to him for his help and much valuable advice.

The Herbaria examined have been those of Columbia College, Harvard College, the Academy of Science of Philadelphia, the State Herbarium at Washington, and that of the Shaw Botanic Garden; and I am under obligation to Dr. Robinson, Mr. Redfield, Mr. Coville and Prof. Trelease for their courtesy in allowing me the use of the collections in their charge.

Messrs. W. B. Hemsley, S. B. Parish, P. A. Rydberg and M. E. Jones have also very kindly supplied me with specimens and field notes, and Dr. H. H. Rusby with references from the MSS. of the Kew Index.

Notes on certain Plants of our Eastern Flora.

RUBUS MONTANUS (*R. villosus montanus* Porter, in BULLETIN 17: 15). Recent observations on this *Rubus* in its native haunts has led me to believe it worthy of elevation to specific rank. Its slender stalks are less prickly than those of *R. villosus* and usually reddish, but the chief difference lies in the fruit, which is much smaller, of oblong shape, often narrowed toward the apex (thimble-like), scarcely fleshy and possessed of a peculiar spicy flavor.

Common and abundant on the mountains of New York and Pennsylvania, where it is popularly known as the "mountain blackberry." It no doubt extends further south.

Solidago Canadensis L.—To this species must probably be referred specimens collected last summer by Mr. J. H. Redfield near Long Pond, Mt. Desert Island, Maine. Sent me under the name of *S. serotina*, they are clearly separated from it by their low, slender, pubescent stems, narrower, more numerous, long-acuminate, triple-nerved leaves, smaller panicles and smaller heads, with acute involucral bracts and shorter rays. The very same form occurs also in Pennsylvania at several stations along the Susquehanna river, and shows a near approach to *S. rupestris* Raf., which Dr. Gray, in the Synoptical Flora, surmises may prove to be "an extreme form of *S. Canadensis*." If this view be adopted, Mr. Redfield's plant must take the varietal name *rupestris* (Raf.).

ASTER CORDIFOLIUS L.—Most frequent and plentiful in our Middle States. It blooms profusely, adorning the woods and fields during the months of September and October. From the allied species it is readily distinguished by its foliage. The radical and lower cauline leaves are orbicular-cordate or oblong-cordate, scabrous above and beneath, thin and membranaceous in tne shade, thicker and stiffer in open grounds, coarsely serrate, and with petioles not at all, or only slightly, margined.

A. CORDIFOLIUS POLYCEPHALUS n. var.—More robust and branched than the type; leaves smaller, the upper ones and the bracts ovate and sessile; panicle ample; heads usually smaller and very numerous; rays deep blue and the disk-florets dark purple (as in *A. lateriflorus*), or both of them sometimes pale or whitish.

Everywhere with the typical form in New Jersey and Eastern Pennsylvania, and its different aspect at once catches the eye of an observer.

ASTER LOWRIEANUS (*A. leiophyllus* Porter). The good and fit name for this species, published in the BULLETIN (**20**: 254), being antedated by *A. leiophyllus* Franch. & Sav. (Enum. Fl. Jap.), is here replaced by another, given in honor of the late J. Roberts Lowrie, who contributed largely to our knowledge of the plants of Central Pennsylvania. The varieties noted in the article of the BULLETIN just cited must follow this change and become respectively *A. Lowrieanus lanceolatus* Porter and *A. Lowrieanus incisus* (Britton). Two small specimens of the typical plant, lately gathered, exhibit amongst heads of the usual size a few that are much larger than the others and like those of *A. lævis*, to which it is related also by the smoothness and leathery texture of the leaves.

ASTER LÆVIS L.—Running through the multitudinous forms of this species, as represented in the Eastern United States, are two marked lines of variation, recognized by Dr. Gray in the fifth edition of his Manual, but in the Synoptical Flora embraced under a single general description. His earlier judgment seems to me better and more consistent. The type of the species (*A. cyaneus* Hoff.) has ovate leaves of moderate breadth, the lower ones abruptly narrowed toward a clasping base. Then comes the variety *lævigatus* (Willd.), with linear-oblong leaves, sometimes from 5 to 7 inches in length, and gradually narrowed to a slender, scarcely-auricled base, often thin and not glaucous; and then a second one, with much shorter large broad-ovate leaves, little contracted below and strongly amplexicaul, for which the name *latifolia* is very suitable. Specimens of this variety exist in the Torrey Herbarium, and it has also been collected in the neighborhood of Easton, Pa.

VACCINIUM PENNSYLVANICUM Lam.—White fruit of this species was obtained last July near Pocono Summit, Monroe county, Pa. The color of the berries was not indeed pure white, for, although fully ripe, they were slightly greenish, and many of them had a faint pinkish tint, and all were pale and somewhat translucent. The huckleberry-pickers of the region say they occasionally meet

with patches bearing fruit of the sort. Hence it appears that such albinoism in the tribe is not confined to *Gaylussacia resinosa*.

MYOSOTIS CÆSPITOSA Schultz.—First found by me (with stout stems and leaves only), submersed in a limestone spring near Mercersburg, Franklin county, Pa., in May, 1852, and next, in a similar spring and in the same condition, near Stroudsburg, Monroe County, by my friend, Mr. T. Dunkin Paret, on the 19th of November, 1891. It has been a long-standing puzzle. The leaves, all under water, were perfectly smooth, and I mistook the plant for *Veronica Anagallis* L. in the young stage. Later (in November, 1892) Mr. Paret sent it to me, with emersed stems and branches, in flower and fruit. These and the leaves covered with scattered and appressed hairs at once showed it to be a *Myosotis*. It agrees well with the characters given for *M. cæspitosa*, and cannot be a form of *M. laxa*, Lehm.

Mentha gentilis L.—Another foreigner, which has come to stay. It is fully naturalized in and around Tobyhanna Mills, Monroe county, Pa., and on the shores of the Delaware above and below Easton, as well as in the gardens and waste places of the city. The larger and older leaves are often mottled with white, as noted by Smith in his English Flora.

CAREX MEADII Dewey. (*C. tetanica Meadii* (Olney) Bailey).

On the 7th of June, 1893, at the invitation of Dr. C. D. Fretz, and accompanied by Drs. Moyer and Thomas, I visited an extensive marshy meadow in the trap-rock reagion, some miles southwest of Sellersville, Bucks county, Pa., in order to obtain this *Carex*, and found it growing there in great abundance and in fine condition. An ample stock of it was secured, including a number of diverse forms, and the study of these forms, in comparison with specimens from other stations east and west, has convinced me that it is entitled to retain its old rank as a distinct species. Although sought for, no typical *tetanica*, nor any approach to it, could be discovered. The results of my studies are embodied in the following description:

Pale green and minutely scabrous; culms rather stout and rigid, 12 to 18 inches high; leaves crowded at the base, stiff, erect, keeled, about 2 lines wide, tapering into a long acumination, the lowest at times exceeding the culm, the others much shorter; staminate spike thick, peduncled or subtended by a small almost

sessile scarcely-bracted pistillate one; pistillate spikes single, but oftener two, and frequently three, the lower ones with conspicuous bracts and on slender, exserted peduncles, of which the lowest rarely starts from near the base and is very much elongated (as happens also in the allied *C. polymorpha*), all of them sometimes staminate at the apex (*C. Carteri* Porter): perigynia crowded a bove, looser below, turgid, deep olive-green, nerved, globular, with a very short, more or less curved beak, or else narrowed upward and somewhat ovoid (*C. tetanica Canbyi* (Olney) Porter), both kinds being occasionally found in the same spike; scales broad, with brownish-purple margins, very obtuse, with or without rough awns, lower ones as long or longer than the perigynia, middle and upper ones shorter or even half as long.

From *C. polymorpha* it is distinguished by its rigid habit, smaller and narrower leaves and the much shorter beak of the perigynium, and from *C. tetanica*, by its stiffer habit, shorter and broader staminate and pistillate spikes, turgid and usually globular shorter-beaked perigynia, and the deep-colored margins of the scales. THOS. C. PORTER.

An Examination of the Pubescence of the Styles and Filaments of Lonicera hirsuta Eaton, L. Sullivantii Gray and L. glauca Hill.

BY A. A. TYLER.

(PLATES 181 AND 182.)

As to the pubescence of the styles and filaments of *Lonicera hirsuta* Eaton, *L. Sullivantii* Gray, and *L. glauca* Hill, the characters given in Gray's Manual of Botany are:

"*L. hirsuta*, lower part of filaments hirsute."

"*L. Sullivantii*, filaments nearly glabrous."

"*L. glauca*, style and base of filaments hirsute."

With a view to determining, if possible, whether these characters are correct and possess the distinctive value usually given them, I have made an examination of the specimens of the three species in the herbarium of Columbia College, kindly furnished by Dr. Britton, at whose suggestion this examination has been undertaken. Not all the specimens of *L. hirsuta*, however, were included among those examined. The specimens in the herba-

rium of Lafayette College have been examined as well, and the results are given with some conclusions drawn from them.

Only a part of the specimens have been figured, the great similarity of many making more figures unnecessary. The filaments are uniformly lettered *a* in the figures, and are shown only as far as the point of adnation, except in figure five, which represents as well part of the adnate portion of the filament, with overlying epidermis torn loose from its attachment to the corolla. The styles are uniformly lettered *b*. In making notes I have not confined myself wholly to the characters in question, as some of the others may shed additional light on the problem.

The plants examined include *L. hirsuta* from the following localities:

Saskatchawan. Scattered hairs on lower half of filament; style rather densely hirsute above, but the hairs thinning out below (Fig. 1). Corolla not glabrous on the outside; leaves pubescent beneath.

Black Hills, Dakota. Filaments sparsely hirsute at base, extending a third of the way up; style densely hirsute in its entire length (Fig. 2). Leaves glaucous and somewhat pubescent below; corolla tube long and narrow, yellow, not glabrous outside.

Middlebury, Vermont. Filaments with long hairs scattered over the greater part of the length but most thickly at base; style thinly hirsute throughout (Fig. 3). Yellow corolla, calyx and upper part of stem glandular pubescent; leaves pubescent on both sides and ciliate-fringed, broadly oval, pale glaucous beneath.

Ashland, Nebraska. Filaments glabrous but with a single hair on each of two; style densely hirsute throughout, as in Fig. 2. Leaves pubescent beneath, not glaucous; corolla tube long and narrow, not glabrous outside.

Ishpening, Michigan. Scattered hairs on the lower half of the filament, as in Fig. 1; style densely hirsute throughout, as in Fig. 2. General characters as in the Vermont specimen.

Isle Royale, Lake Superior. Filament and style as in the last; leaves nearly glabrous above, glandular pubescence of corolla less dense.

Oswego, New York. Filament with hairs scattered over the greater part of the length; style thinly hirsute throughout, in both

cases as in Fig. 3, but slightly denser. Corolla purplish, *hirsute on the outside but not glandular;* leaves thickish, glabrous, glaucous beneath.

Monroe county, Pennsylvania. Filaments with a few hairs at the base, as in Fig. 6; style wholly glabrous. General characters as in the Vermont specimen.

Lycoming county, Pennsylvania. Filament sparsely hirsute a third of the way up; style hirsute throughout, as in Fig. 2. Corolla glandular pubescent outside, leaves pubescent beneath.

Clearfield county, Pennsylvania. Filament with scattered hairs, except near the top, as in Fig. 3. General characters as in the Vermont plant.

Armstrong county, Pennsylvania. Filament pubescent on lower third; style densely hirsute throughout, as in Fig. 2. Corolla purplish, glandular pubescent outside; leaves thickish and pubescent only below; also pale glaucous below.

Fayette county, Pennsylvania. Filament hairy at base, as in Fig. 2; style hirsute throughout, somewhat less densely than in Fig. 2. Corolla glandular pubescent on the outside. Leaves glabrous, pale glaucous below.

But one specimen of *L. Sullivantii* was available for examination, and that being one of the type-specimens from the Columbia College Herbarium naturally corresponds with the description of Dr. Gray, and we can arrive at no definite conclusion with regard to it. The filament and style of this plant are shown in Fig. 4. The upper part of the style exhibits a few scattered hairs which are not mentioned in the description of the species.

In the specimens of *L. glauca* examined the outside of the corolla and the leaves are uniformly glabrous and the latter glaucous beneath; tube of corolla short, gibbous at base; flowers usually purplish. Flowers were examined from plants collected in the following localities:

Narrowsville, Bucks county, Pennsylvania. Both filaments and style wholly glabrous with the exception of two hairs near the base of the style of a single specimen (Fig. 5).

Charles City, Iowa. Filament with a few scattered hairs at the base; style thinly hirsute throughout (Fig. 6).

Navy Island, New York. Filaments covered nearly half way up with long fine pubescence. Style wholly glabrous (Fig. 7).

Lake Superior, of Dr. Gray's collection. Filaments slightly bearded at base with a few scattered hairs on the style (Fig. 8), tube of corolla long and narrow.

Chapman's specimen, also from Navy Island, has the same characters as the other (Fig. 7).

Wautauga River, North Carolina. Filament and style wholly glabrous, as in Fig. 5.

Blair county, Pennsylvania. Filament and style glabrous.

Huntingdon county, Pennsylvania. Filament glabrous; style with scattered hairs, intermediate between Figs. 6 and 8.

Easton, Pennsylvania. Filament hairy at base, as in Fig. 2; style glabrous.

Lancaster county, Pennsylvania. Filament and style wholly glabrous.

Of the twelve specimens of *L. hirsuta* examined, ten have the filaments hirsute or more sparingly hairy at base, often with hairs more thinly distributed nearly to the top, one has glabrous filaments, and one has but a few hairs at the base. The styles in ten of the plants are more or less densely hirsute throughout, one is glabrous, and one but slightly hairy at a point near the base.

Of the ten specimens of *L. glauca* five were found to have glabrous filaments, two had fine pubescence on the lower half and three were more or less hairy at base. The styles were glabrous in seven specimens; in two, thinly hirsute throughout; in one, with scattered hairs.

It, therefore, appears that the characters under consideration are variable, especially in *L. glauca*, but may with safety be given as follows: *L. hirsuta*, style and base of filament usually hirsute, but occasionally glabrous or nearly so; *L. glauca*, style and filaments usually glabrous, but the style sometimes more or less hairy, and base of filaments hairy or pubescent.

Germination of the Spores of Cerebella Paspali.

By Geo. F. Atkinson.

(Plate 183.)

Specimens of *Cerebella Paspali* C. & M. were collected by the the writer in August, 1891, at Auburn, Ala., on *Paspalum platycaule*. Since there is some doubt as to the relationship of this genus to the other genera of the Ustilagineæ, it seemed well in the spring of 1892 to undertake the germination of the spores, that their behavior under those circumstances might be observed.

Cultures were made in Van Tieghem cells in water, and the development of the mycelium carefully traced. The first sowing was made April 2d, and in twenty-four hours the spores were germinating, as shown in figures 2 and 3. One or all of the cells of the glomerules, or spore balls, may germinate. The germ tubes are rich in granular protoplasm, and are also abundantly supplied during their early growth with quite numerous highly refringent granules. Septa arise also quite early, dividing the threads into cells, which are at first in length two or three times their diameter. Later they may become shorter by further division. These threads, which are homologous with the promycelium of the Ustilagineæ in common, do not seem to function as promycelia in the ordinary sense, *i. e.*, they do not bear sporidia. On the other hand, quite an extended weft of mycelium is developed and the threads branch profusely. Frequently, where threads or their branches from the same spore ball or from different spore balls come in contact fusion takes place in the same manner as in the mycelium of many of the pyrenomycetous and hyphomycetous fungi. Figures 4 and 5 show quite an extended growth of mycelium from two spore balls, which at figure 6 is fusing in several places. In a few days vacuoles appear in the protoplasm of the thread cells, which become more and more prominent with the age of the thread. At the same time the older cells become strongly constricted at the septa, so that the individual cells, which are now shorter by the formation of intermediate septa, are nearly oval in form. Also the mycelium now begins to darken

and in the cell cultures became of a reddish brown color much the same as the color of the mycelium found in the sori at the maturity of the fungus on its host.

Dilution cultures for the separation of the fungus were started in ordinary nutrient agar-agar. The spores germinated well, but no sporidia were developed, and in the course of a week a portion of the mycelium was transplanted to dead cornstalk pith which had been saturated with agar. Here the fungus grew profusely, but did not fruit, the substratum probably being not of the proper nature to encourage the normal development of the plant. After two weeks' growth the mycelium was examined, and a small portion of it is represented in figure 7. The older portions now present a moniliform appearance, the cells possessing very large vacuoles and the walls being very brown in color.

The genus *Cerebella* was first described by Cesati from specimens on *Andropogon Ischæmi* in Italy, and was supposed to be related to certain of the Hyphomycetes, as *Sporodesmium*.* Berkley† suggested its relationship with *Polycystis*. De Toni‡ places it among the Ustilagineæ, and suggests its close relationship with *Urocystis* or *Thecaphora*. The appearance of the spore balls suggests a much closer relationship with *Thecaphora* than with *Urocystis*, but the germination of the spores does not show a very close relationship with either, and the mycelium from the spore is very different from the promycelium of either *Urocystis* or *Thecaphora*. The failure to produce sporidia would not form a very strong argument against the location of this plant in the Ustilagineæ, since Brefeld§ found that the dusty smut of barley and the smut of wheat did not in nutrient solutions produce sporidia. But certain characters of the mycelium would seem to favor its exclusion from the Ustilagineæ, but this will be still a matter of doubt until the other species of the genus have been studied.

Botanical Department, Cornell University.

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* Saccardo Syll. Fung. **4**: 761.

† Gardeners' Chronicle, 1852, 643.

‡ Sacc. Syll. Fung. **7**: 2, 515.

§ Journ. Mycol. **6**: 1890–91, 153 (translation from the Nachrichten aus dem Klub der Landwirthe zu Berlin, Nos. 220–222).

Shrinkage of Leaves in Drying.*

(PLATE 184.)

While it is well known that foliage undergoes a shrinkage in the ordinary process of drying, the amount has not heretofore been considered great or perhaps worthy of mention. The Solandi process of sun printing previously considered (see page 485 of the BULLETIN Vol. 20), permits of an accurate and rapid recording of the shrinkage of foliage, and by means of it the accompanying outlines (Plate 184) are obtained and figures deduced below.

Fresh leaves were measured by securing sun prints as soon as convenient after being gathered. They were then put in press and dried in the ordinary way for making herbarium specimens. After they were fully dried, a second print was taken or the leaf itself used, and from these two measurements the comparisons are made. It is, of course, an easy matter to take a print each day up to the time the leaf is dry, and in that way determine when in the period of drying that the greater shrinkage takes place.

In order to determine what portion of the leaf surface underwent the more contraction, many of the samples of leaves were first brought with the surface upon a "card" used by hostlers in combing the manes of their animals. In this way small holes practically equidistant were made in the blade, and by means of these, the central ones being taken as fixed points, the shrinkage for all surrounding areas is determined.

The leaves of endogenous plants shrink less than those of the exogens and very little in length. Thus a leaf three inches long of a cultivated cypridpedium gathered in its full vigor loses but a small fraction of an inch in its length, and the same is true of fresh green leaves of a grass (*Panicum*) shown at *a*, while a five inch long leaf of lily-of-the-valley (*b*) shrunk largely in width, but almost none in length. But a somewhat similar leaf (*Helianthus*), as to shape and total area, shrank greatly in all directions and lost 27 per cent. of its original surface. The common plantain (*Plantago major*) bears a large leaf which exhibited a striking amount of

* Read before Section G., A. A. A. S., Madison, Wis., August, 1893.

shrinkage, as shown by the outlines of the fresh and dried leaf at *c*. The amount of loss in this instance was 44 per cent. At *d* is shown in its two dimensions a hollyhock leaf, this being of the palmate type. This leaf was while fresh punctured in a manner previously described, and the inner line shows how nearly equal the shrinkage was upon all sides. In the center of the lower portion of the plate is the outline of a fresh leaf of the purslane (*Portulacca oleracea*), and within it the same when dried. This is a leaf with very little framework.

A most striking example of shrinkage is seen in the outlines for a catalpa leaf shown at *f;* however, this leaf was gathered before it had reached its full size; its loss was 45 per cent. At *g* is shown a grape leaf, and one of an abutelon at *h*.

The following table gives the per cent. of shrinkage of several kinds of leaves examined:

Endogens.		Exogens.	
Pontederia,	11 per cent.	Hollyhock,	21 per cent.
Lily-of-the-Valley,	14 " "	Maple,	22 " "
Orchid,	19 " "	Smartweed,	23 " "
Panic grass,	27 " "	Helianthus,	27 " "
Average,	18 per cent.	Purslane,	35 " "
		Plantain,	44 " "
		Catalpa,	45 " "
		Average,	31 per cent.

The average for the two groups is almost exactly 25 per cent., or in other words a loss by shrinkage in the drying of foliage of one-fourth the original size.

There are many reasons why types of plants should be seen by all monographers, but if types are so essential the writer, in view of the above facts, would plead for a sight of the fresh plants whenever possible. It is fortunate that descriptions are made in large part from dried specimens, or else the measurements for leaves, if at all precise (as usually they are not), would be uniformly too small for the green foliage.

A study of the outlines thus obtained leads to the conclusion that the greater shrinkage is in those localities containing the fewest veins and ribs. It is possible that there is a law of shrinkage

to be expressed in the following terms: Leaves in drying under uniform lateral pressure shrink in all parts around and toward the geographical center of the mass of tissue composing its framework. A more general and condensed form of this law is: Leaves in drying under pressure shrink towards the mass-center of the framework.

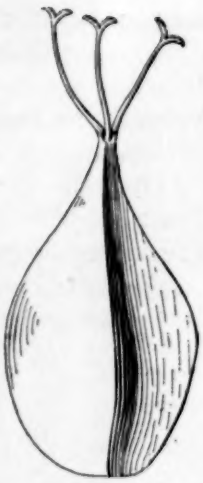
BYRON D. HALSTED.

Morphological Notes on the Genus Brunnichia.

The following lines are intended to correct several errors recorded in the works of our leading authorities on genera. Being engaged in a study of some of the Polygonaceæ, the mistakes cited below attracted my attention. They seem to have been made by Endlicher in his Genera Plantarum and are apparently being perpetuated by later writers.

1. *The Calyx of Brunnichia.* Endlicher (Genera Plantarum, 310) says in regard to this: "Perigonium . . . . quinquepartitum, laciniis oblongis . . . . apice conniventibus." According to Bentham and Hooker (Genera Plantarum 3: 103) we should find "Perianthium 5-fidum . . . . lobis conniventibus," while Baillon records this: "Sepala 5, 6, oblonga . . . . circa fructum conniventibus." (Hist. Pl. 11: 393). All these descriptions are given in the place of Bank's original. "Calyx . . . . revolutis." (Gærtn. Fr. et Sem. 1: 214) or some corresponding phrase, which is the correct interpretation of the fact. The figure on Gaertner's table 45 is also correct.

In all probability the error arose by these authors taking their diagnoses from dried or dead specimens. In the living plant the segments of the calyx are revolute or reflexed, and it is only when they die or are dried that the segments converge. However, if soaked in water the calyx-lobes will take their natural position. This I have verified by all the specimens at hand.



2. *The Stigmas of Brunnichia.* — The three authors mentioned above have also given a very misleading interpretation of the stigmas of the genus under consideration. Endlicher (Genera Plantarum, 310) describes them as "Stigmata capitata, emarginata." Bentham and Hooker (Genera Plantarum, 3: 103) say, "Styli 3 . . . apice capitato-stigmatosi," and Baillon (Hist. Pl. 11: 393) gives, "Styli ramis 3, apice capitato stigmatoso." Again, these erroneous descriptions have been republished and convey a wrong idea. Here, too, Banks was correct in saying (Gærtn. Fr. et Sem. 1: 214), "Stigmatibus bifidis." This is the right interpretation, as the stigmas are simply two-cleft, a fact brought out by even a casual examination. This, too, I have confirmed by an examination of the specimens in the Columbia College Herbarium.

The accompanying figures explain themselves.

JOHN K. SMALL.

Proceedings of the Club.

WEDNESDAY EVENING, JANUARY 31ST, 1894.

The Rev. Mr. Lighthipe in the chair and thirty-five persons present.

Mr. Charles L. Pollard, of New York, and Mr. Morris E. Leeds, of Philadelphia, were elected active members.

Upon motion by Dr. Rusby, the Section on Cryptogams, Committee on Local Flora, was requested to devise and submit to the Club a plan for the preparation of a check-list of North American Cryptogams, similar to that on Phanerogams authorized by the Rochester meeting of the A. A. A. S., and based upon the same rules of nomenclature, together with an estimate of the cost of the same.

The regular paper of the evening was then presented by Miss Marion McEwen, entitled "The Comparative Anatomy of *Corema Conradii* and *Corema alba*." The paper was illustrated by drawings and specimens. The history and distribution of the genera and species of Empetraceæ and the morphological relations of the *Coremas* were briefly presented, and the general anatomical characters of the leaves and stems of the latter described and contrasted. The chief object of the study was to determine the generic and specific relationship of the two, and the conclusion was reached that they were distinct species of one genus. Incidentally, their anatomical relations with the Ericaceæ were pointed out.

Dr. Britton discussed the distribution of the order and remarked that it indicated generic differences in the two species, but considered that the results of Miss McEwen's studies disproved this theory.

Dr. Britton presented a small trunk of *Zanthoxylum Clava-Herculis* L. and remarked upon its peculiar corky spine-bases and its similarity to and confusion (as to common name) with *Aralia spinosa* L. Dr. Rusby remarked that an anatomical study of the barks had led the late Prof. John M. Maisch to the conclusion that there was not a specific identity between the plants called *Z. Clava-Herculis* of the Southern United States and of the West Indies, a conclusion afterward confirmed by systematic botanists. Miss Gregory remarked that the age of the tree could be determined from a section of the corky cushions as well as by counting its annual rings.

Tuesday Evening, February 13th, 1894.

The President in the chair and seventeen persons present.

A letter was received from Mrs. Lydia D. Pychowska, describing the formation of large ice crystals in late autumn on stems of the scarlet Mexican *Salvia*. Dr. Britton remarked on similar phenomena observed by Prof. Lester F. Ward in *Cunila*, and Mr. Kearney stated that Elliott has recorded them in *Pluchea*. Their frequent occurrence in *Helianthemum* is well known.

The following papers were read:

"A Review of the Fossil *Salvanias* with Description of a new

Species from the Laramie Formation of Washington," by Mr. Arthur Hollick. The paper was illustrated by drawings and specimens, and will be published in a subsequeut issue of the BULLETIN.

"Observations on the early Stages of the Formation of the Lichen Thallus," by Dr. Carlton C. Curtiss, illustrated by drawings.

"Some new or little known Plants of the Southern United States," by Mr. T. H. Kearney, Jr., illustrated by specimens (to be published in a subsequent issue of the BULLETIN).

"The Floral Morphology of *Brunnichia*," by Mr. John K. Small, illustrated by specimens and drawings (published in the present issue of the BULLETIN).

Index to Recent Literature relating to American Botany.

Baker, Edmund G. Supplement to Synopsis of Malveæ. Journ. Bot. **32**: 35–38. F. 1894.

Baker, J. G. *Dyckia Desmetiana.* Curt. Bot. Mag. *t. 7340.* F. 1894.

Bicknell, E. P. *Ranunculus micranthus* Nutt. Bull. Torr. Bot. Club, **21**: 41, 42. 25 Ja. 1894.

Maintains the specific identity of this plant, contrasting it with *R. abortivus.*

Bioletti, F. T. An Experience in Herbarium making. Erythea, **2**: 31–34. 9 F. 1894.

Blodgett, Frederick H. On the Development of the Bulb of the Adder's tongue. Bot. Gaz. **19**: 61–65, *pl. 7, 8.* 16 F. 1894.

Account of *Erythonium Americanum.*

Britton, Elizabeth G. Contributions to American Bryology—IV.—Notes on the North American Species of *Orthotrichum*—II. Bull. Torr. Bot. Club, **21**: 1–15. 25 Ja. 1894.

Notes on the species with immersed stomata.

Britton, N. L. New or noteworthy North American Phanerogams—VIII. Bull. Torr. Bot. Club, **21**: 27–34, *pl. 173.* 25 Ja. 1894.

Notes on various species; synopsis of N. A. species of *Stenophyllus;* describes *Galium Oreganum* n. sp.; proposes *Meehania* n. gen. for *Dracocephalum cordatum* Nutt.

Clute, W. N. Late-blooming Trees. Science, **23**: 49. 1894.

Coville, Frederick Vernon. The genus *Hemicarpha* in North America. Bull. Torr. Bot. Club, **21**: 34–37. 25 Ja. 1894.

Describes the two species *H. micrantha* and *H. occidentalis,* and *H. micrantha aristulata* n. var.

Davidson, Anstruther. Californian Field Notes—II. Erythea, **2**: 27–30. 9 F. 1894.
Notes on *Calochortus* and new records for Catalina Island.

Durand, Elias J. *Buxbaumia indusiata* Bridel in Central New York. Bull. Torr. Bot. Club, **21**: 38, 39, *figs.* 25 Ja. 1894.

Ellis, J. B. and **Everhart, B. M.** New West American Fungi. Erythea, **2**: 17–27. 9 F. 1894.
Describes 29 species of Pyrenomycetes and Fungi imperfecti from Kansas and California.

Fritsch, Karl. Ueber einige *Licania*-Arten. Oesterr. Bot. Zeitschrift, No. 1. 1894 (reprint).
Description of *Licania subcordata* from Brazil.

Greene, Edward L. Manual of the Botany of the Region of San Francisco Bay. 8vo. pp. 328, San Francisco. 2 F. 1894.
A descriptive flora of the region.

Hallock. N. Sassafras trees. Science, **23**: 51. 1894.

Halsted, Byron D. The Mint Rust upon the Variegated Balm. Bull. Torr. Bot. Club, **21**: 40–41. 25 Ja. 1894.
Notes occurrence of *Puccinia Menthæ* on *Melissa officinalis.*

Heller, A. A. Plants from Virginia new to Gray's Manual Range, with notes on other Species. Bull. Torr. Bot. Club, **21**: 21–27. 25 Ja. 1894.
Notes on various species: *Pentstemon Smallii* n. sp. described.

Hooker, J. D. *Pentarhaphia longiflora.* Curt. Bot. Mag. *t. 7339.* F. 1894.

Jack, J. B. *Stephaniella paraphyllma* Jack, nov. gen. Hepaticarum. Hedwigia, **33**: 11–14, *figs. 1–8.* 30 Ja. 1894.
From Cienega, in Argentino-Bolivian Alps.

James, Jos. F. Fungi and Insects. Science, **23**: 52. 1894.

Jenman, J. S. *Nephrodium* (*Eunephrodium*) *bibrachiatum.* Gard. Chron. **15**: 230. 24 F. 1894.
Description of a new fern from the island of Jamaica.

Jenman, J. S. *Nephrodium* (*Lastrea*) *Grenadense.* Gardn. Chron. **15**: 198. 17 F. 1894.
Description of a new fern from Grenada, W. I.

Johnson, L. N. On some species of *Micrasterias.* Bot. Gaz. **19**: 56–60, *pl. 6.* 16 F. 1894.
Notes on *M. foliacea*, *M. pinnatifida* and *M. furcata* with which *M. pseudofurcata* Wolle is united.

Mabry, T. O. A Curiosity in the Vegetable World. Science, **23**: 47. 1894.

Meehan, T. *Mertensia Virginica.* Meehans' Month. **4**: 33, *pl. 3.* Mr. 1894.

Parish, S. B. Trees of Southern California. Zoë, **4**: 332–353. 6 F. 1894 (reprint).

Renauld, F., and **Cardot, J.** Mousses Nouvelles de l'Herbier Boissier. Bull. Herb. Boiss. **2**: 32. Ja. 1894.

Description of *Hypnum* (*Harpidium*) *Barbeyi,* a new species from La Paz, Bolivia.

Sargent, C. S. *Darbya umbellata.* Gard. and For. **7**: 74, *fig. 16.* 21 F. 1894.

Sargent, C. S., Editor. A fastigiate Sugar-Maple. Gard. and For. **7**: 65, *fig. 12.* 14 F. 1894.

Sargent, C. S., Editor. The Pride of China tree. Gard. and For. **7**: 92. 7 Ma. 1894.

With illustration of *Melia Azedarach umbraculifera* in Riverside, California.

Schrenk, Hermann. Parasitism of *Epiphegus Virginiana.* Proc. Am. Micros. Soc. **15**: 91–128, *pl. 1–10.* 1894 (reprint).

Scribner, F. Lamson. Two new Grasses. Bull. Torr. Bot. Club, **21**: 37–38. 25 Ja. 1894.

Describes *Panicularia laxa* from Maine and *Poa Chapmaniana* from Missouri, Tennessee and Florida.

Small, John K. Studies in the Botany of the Southeastern United States—I. Bull. Torr. Bot. Club, **21**: 15–20, *pl. 170, 171.* 25 Ja. 1894.

Notes on various Spermatophytes. Describes and figures *Amorpha virgata* n. sp. and *Hieracium Scribneri* n. sp.

Stephani, F. Hepaticarum species novæ—V. Hedwigia, **33**: 1–10. 30 Ja. 1894.

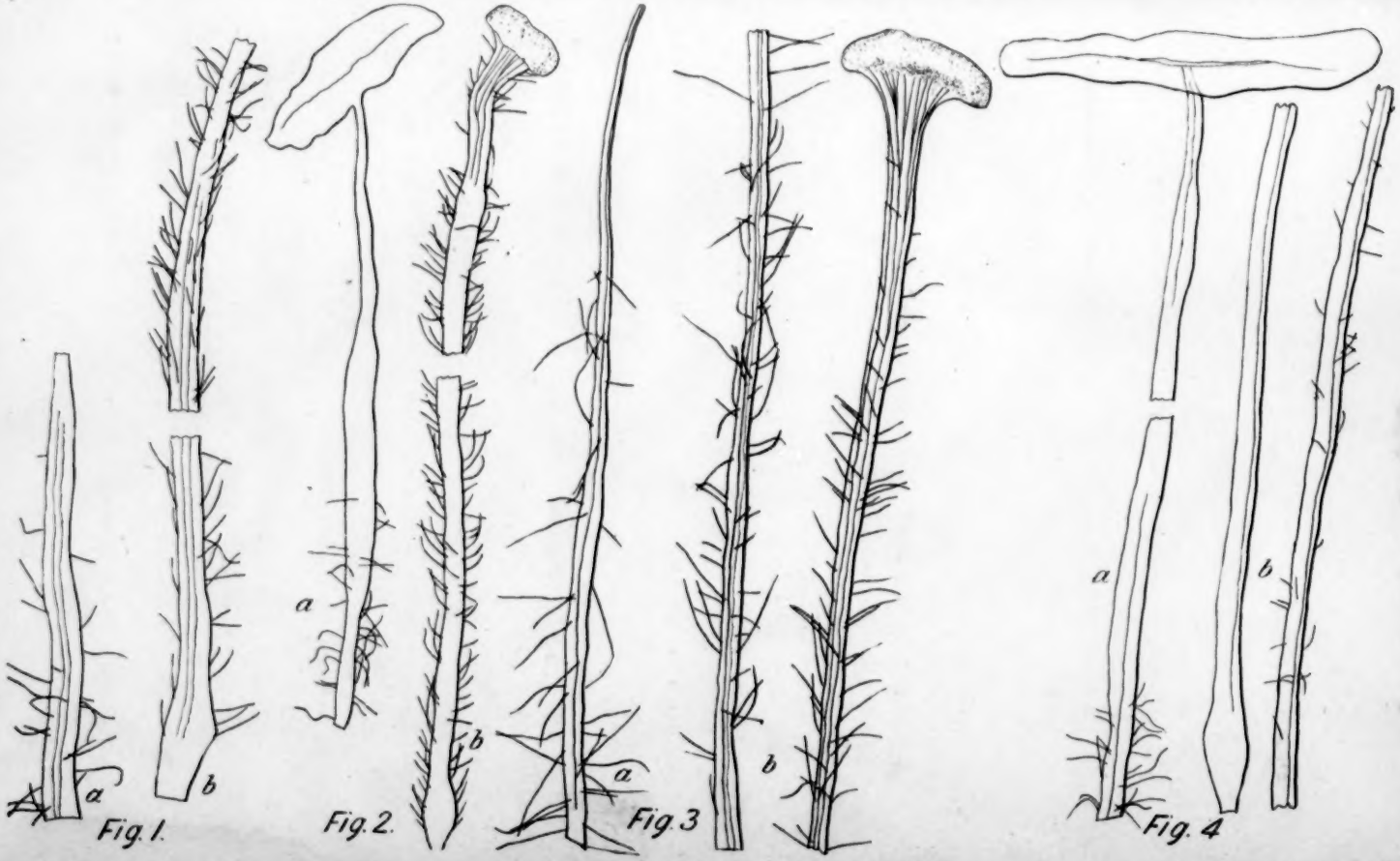
Describes 10 new species and *Delavayella* n. g. *Fossombronia lamellata* n. sp. from Buenos Ayres is the only American species.

Thaxter, Roland. Contributions from the Cryptogamic Laboratory of Harvard University, XXII.—Observations on the genus *Nægelia* of Reinsch. Bot. Gaz. **19**: 49–55, *pl. 5.* 16 F. 1894.

Notes on *Sapromyces Reinschii* (Schroet.) Fritsch, from Maine.

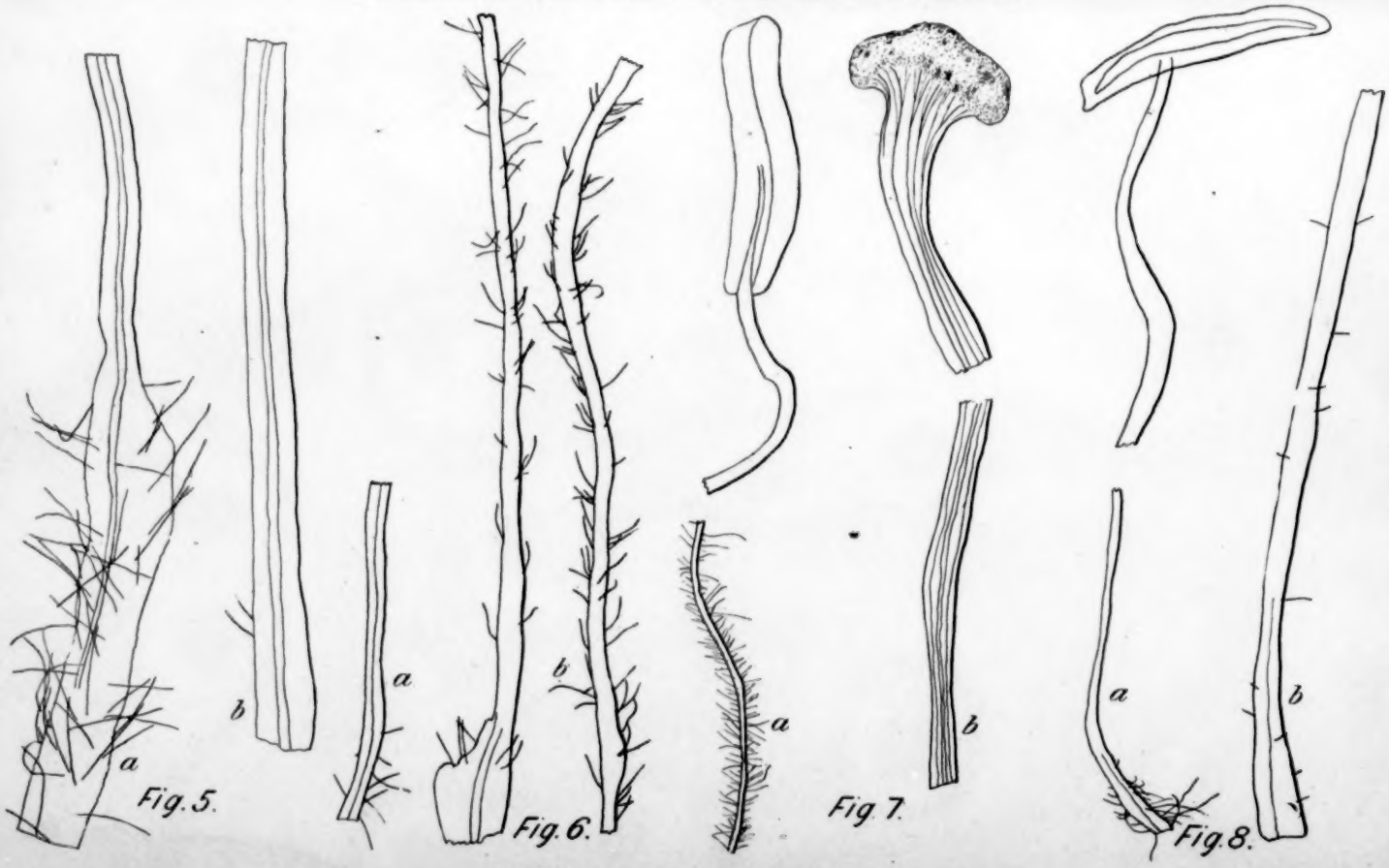
Toumey, J. W. The gradual Disappearance of the Range Grasses of the West. Science, **22**: 9. Ja. 1894.

Erroneously printed **Tourney, I. W.** in February BULLETIN, owing to misprint in original.

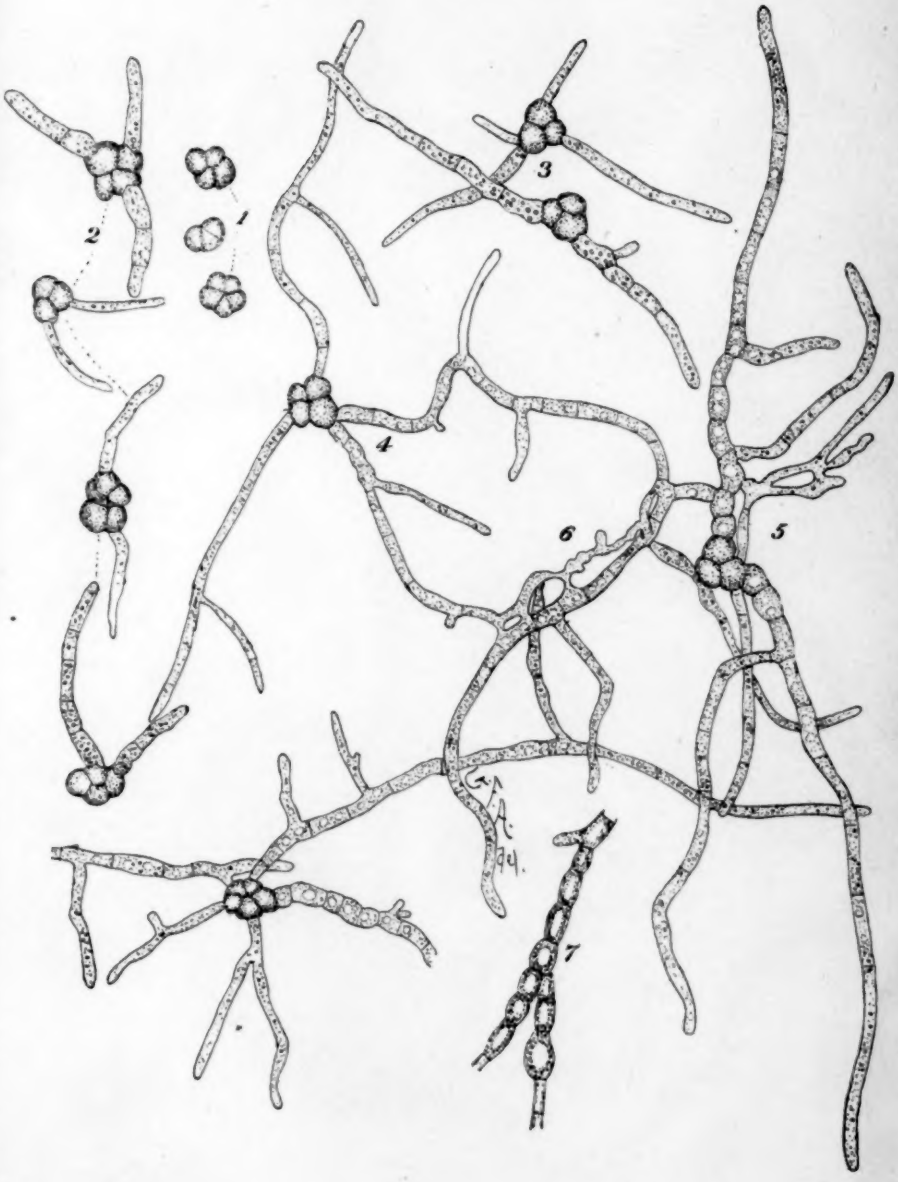


STAMENS AND STYLES OF LONICERA.

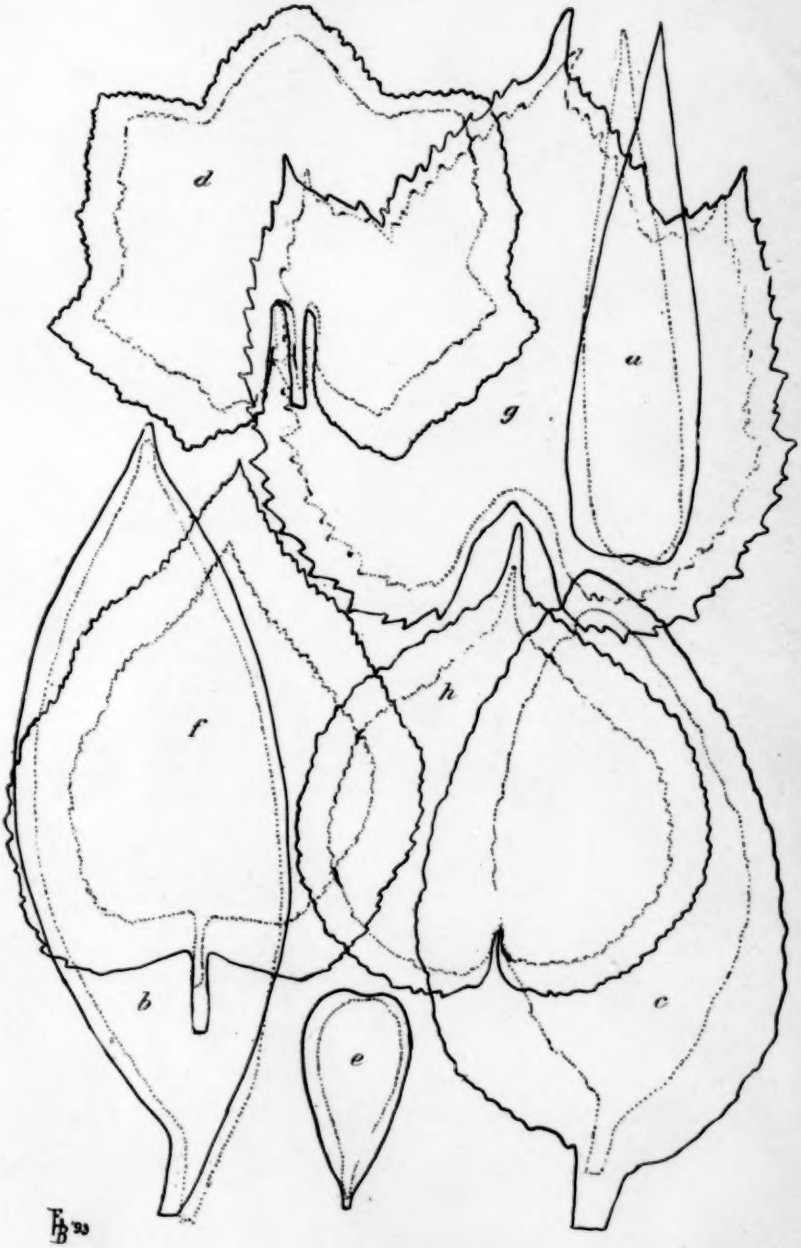
BULLETIN OF THE TORREY BOTANICAL CLUB.—PLATE 182.



STAMENS AND STYLES OF LONICERA.



GERMINATION OF THE SPORES OF CEREBELLA PASPALI.



THE SHRINKAGE OF LEAVES IN DRYING.

Contributions from the Herbarium of Columbia College.

[The numbers omitted from this list are out of print.]

No. 4. A List of Plants Collected by Miss Mary B. Croft at San Diego, Texas. By N. L. Britton and H. H. Rusby (1887), ... 25 cents.

No. 5. New or Noteworthy North American Phanerogams. By N. L. Britton (1888), ... 25 cents.

No. 6. An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1886–1887. By N. L. Britton. (Twenty-three parts published; not yet completed.)

No. 7. The Genus *Hicoria* of Rafinesque. By N. L. Britton (1888), . 25 cents.

No. 8. A Recent Discovery of Hybrid Oaks on Staten Island. By Arthur Hollick. (1888), ... 25 cents.

No. 9. A List of Plants Collected by Dr. E. A. Mearns at Fort Verde and in the Mogollon and San Francisco Mountains, Arizona, 1884–1888. By N. L Britton.

The General Floral Characters of the San Francisco and Mogollon Mountains and the Adjacent Region. By H. H. Rusby (1888), ... 25 cents.

No. 11. Preliminary Notes on the North American Species of the Genus *Tissa*, Adans. By N. L. Britton (1889), ... 25 cents.

No. 12. The Genus *Eleocharis* in North America. By N. L. Britton (1889), 25 cents.

No. 13. New or Noteworthy North American Phanerogams, II. By N. L. Britton 1889), ... 25 cents.

No. 14. A List of State and Local Floras of the United States and British America. By N. L. Britton (1890), ... $1.

No. 15. A Descriptive List of Species of the Genus *Heuchera*. By Wm. E. Wheelock (1890), ... 25 cents.

No. 16. New or Noteworthy North American Phanerogams, III. By N. L. Britton (1890), ... 25 cents.

No. 17. The Flora of the Desert of Atacama. By Thos. Morong (1891), . 25 cents.

No. 19. Notes on North American Haloragæ. By Thos. Morong (1891), . 25 cents.

No. 20. New or Noteworthy North American Phanerogams, IV. By N. L. Britton. (1891), ... 25 cents.

No. 21. Notes on the North American Species of Eriocauleæ. By Thos. Morong (1891), ... 25 cents.

No. 22. New or Noteworthy North American Phanerogams, V. By N. L. Britton (1891), ... 25 cents.

No. 23. The American Species of the Genus *Anemone* and the Genera which have been referred to it. By N. L. Britton (1891), ... 25 cents.

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No. 25. A Preliminary List of the Species of the Genus *Meibomia* occurring in the United States and British America. By Anna M. Vail (1892), . 25 cents.

No. 26. A List of Species of the Genera *Scirpus* and *Rynchospora* occurring in North America. By N. L. Britton (1892), ... 25 cents.

No. 27. Note on a Collection of Tertiary Fossil Plants from Potosi, Bolivia. By N. L. Britton (1892), ... 25 cents.

No. 28. The Anatomy of the Stem of *Wistaria Sinensis.* By Carlton C. Curtiss (1892), ... 25 cents.

No. 29. New or Noteworthy North American Phanerogams, VI. By N. L. Britton (1892), ... 25 cents.

No. 30. *Ranunculus repens* and its Eastern North American Allies. By N. L. Britton (1892), ... 25 cents.

No. 31. A Preliminary List of American Species of *Polygonum.* By John K. Small. (1892), ... 25 cents.

No. 33. A New Species of *Listera*, with Notes on Other Orchids. By Thos. Morong (1893), ... 25 cents.

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The series as above listed will be supplied for $8.

Copies of the Catalogue of Plants found in New Jersey (1889), by N. L. Britton, may be had for **$2.**

Address

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NEW YORK CITY.